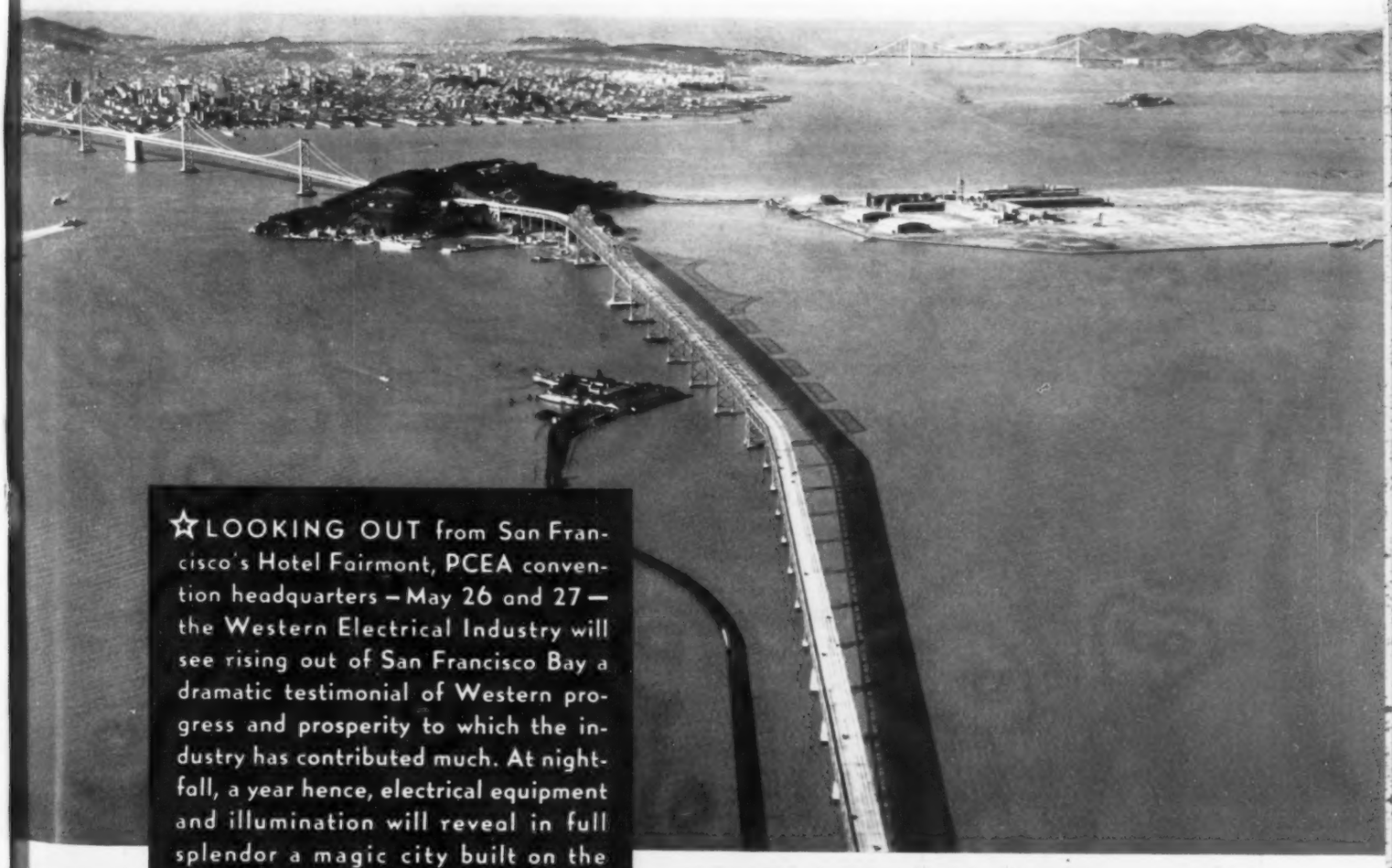
ELECTRICAL WEST

THE ALL-INDUSTRY MAGAZINE OF PROGRESS



☆LOOKING OUT from San Francisco's Hotel Fairmont, PCEA convention headquarters – May 26 and 27 – the Western Electrical Industry will see rising out of San Francisco Bay a dramatic testimonial of Western progress and prosperity to which the industry has contributed much. At nightfall, a year hence, electrical equipment and illumination will reveal in full splendor a magic city built on the largest man-made island in the world.

McGRAW-HILL CO. OF CALIF. · · · PRICE 25c PER COPY

MAY 1938

Pin-Money
ELECTRIC
RANGE EVENT
And an Amazing SPECIAL OFFER
FOR A LIMITED TIME ONLY
3 QUART
2 QUART
4 QUART
CHICKEN FRYER
DUTCH OVEN
Get Your Electric
Range Now... AND YOU
GET THIS GENUINE 4-PIECE SET OF
"WEAR-EVER" FOR YOUR OLD STOVE
Guaranteed Retail Value of this Wear-Ever 4-piece Set
$14.75
These New Utensils were designed just for Electric Ranges
Cook faster, easier, and better with these "Wear-Ever" utensils! You'll be proud to own them—you'll be amazed at the look at their special features!
1. straight sides, flat bottom for quick, even heating
2. made of thick sheet aluminum, heavy but not bulky
3. snug covers, will not bang with steam
4. recessed handles for convenient stacking
5. reduce food shrinkage, save food flavors
6. most beautiful and practical utensils available
THINK OF ALL THE ADVANTAGES THIS MODERN COOKING METHOD GIVES YOU...BUY AT TODAY'S LOW PRICES AND SPECIAL LOW TERMS
NOW for just a few pennies a day—the easiest terms ever offered—you can have the comfort, economy, convenience, and cleanliness of a modern electric range. And, in exchange for your old stove—AT NO EXTRA COST—a 4-piece set of the marvelous "Wear-Ever" electric range utensils. Choice of many popular makes of electric ranges—see them at your Edison Office or your Dealer. You won't be able to resist this combination offer—you'll be glad you couldn't. Buy now and save money!
Edison
SEE THE NEW "ELECTRICS" NOW on display at your EDISON OFFICE or your DEALER
Widening the
Appliance Market

"Pin-Money" Event Stimulates Range Sales

Timed to coincide with the opening of the Spring selling season, the "Pin-Money Electric Range Event" is being advertised in 170 newspapers throughout Edison territory. These smashing ads, running up to half-page size, feature a trade-in offer that is producing many new range sales for the alert appliance dealer.

SOUTHERN CALIFORNIA EDISON COMPANY LTD.

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The All-Industry Magazine of Progress

ELECTRICAL WEST

MEMBER AUDIT BUREAU OF CIRCULATIONS

ESTABLISHED 1887 AND INCORPORATING THE "ELECTRICAL JOURNAL," "JOURNAL OF ELECTRICITY, POWER & GAS" AND "JOURNAL OF ELECTRICITY"

ABP

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883 Mission Street, San Francisco

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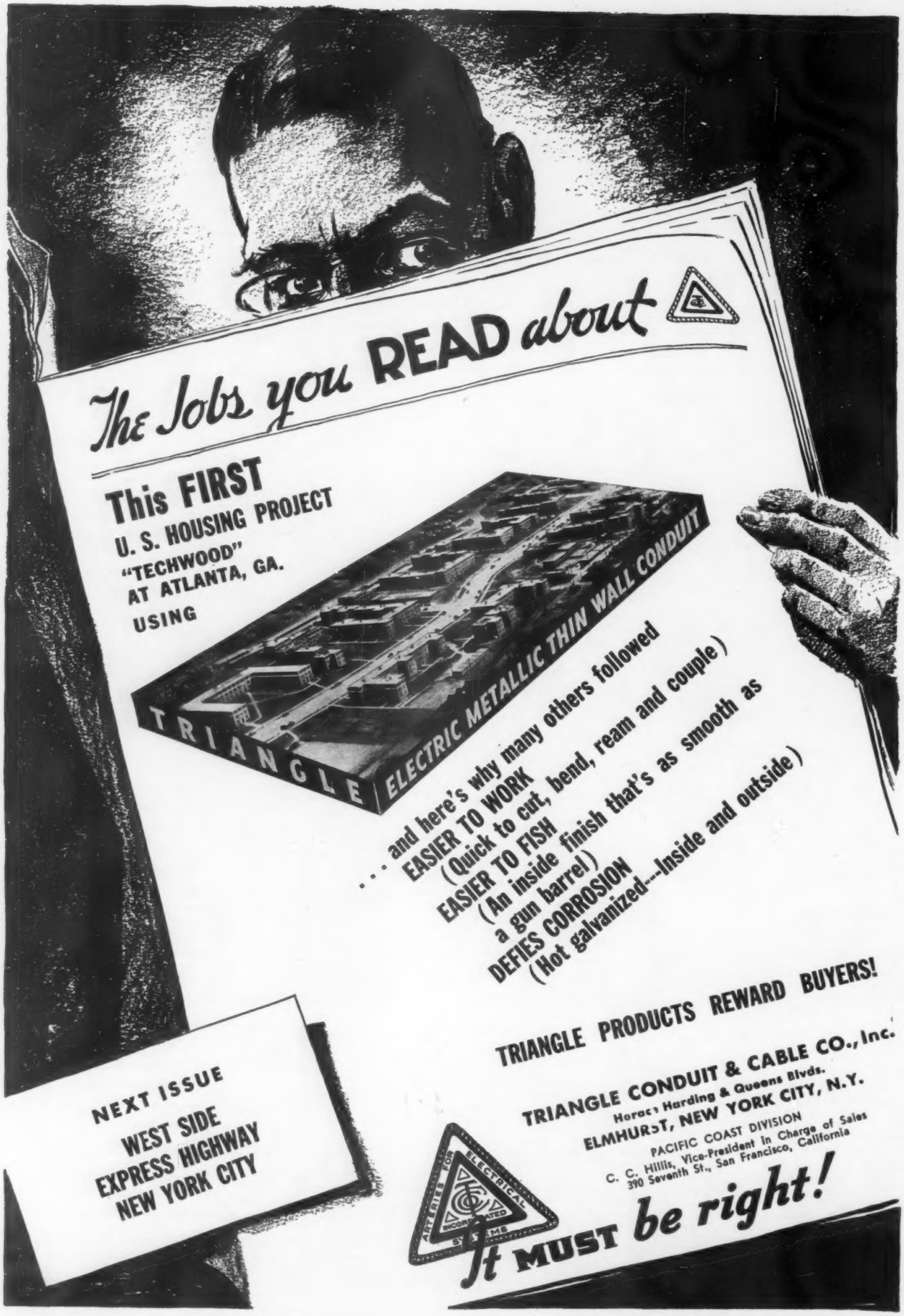
IDEA FROM ROLLO

IF you were ever editor of a college magazine you'll know how Rollo felt when, at the end of the year, he found that he'd published only seven of the eight issues of the Ra Ra Engineer. To Rollo, who had toothed and nailed all year to get enough advertising and subscriptions and editorial matter for the Engineer, this was the final, unpalatable straw. Rollo didn't have the foggiest notion where he was going to find even two pages of copy with which to make the eighth issue. He could only scrunch down in his chair and groan. ❧ Then flash! the answer came to him. ❧ Pictures. Lots of pictures. And who could supply a better assortment than ELECTRICAL WEST? ❧ Hadn't ELECTRICAL WEST, the magazine with more, and more informative, pictures than any other in the field, helped him out on almost every issue? Probably it would do so again. ❧ ELECTRICAL WEST did. In no time at all it dug up enough pictures and engravings to fill ten issues of the Ra Ra Engineer. And what was more —every one of those pictures illustrated something of vital importance. Why? Because covering the Eleven Western States as it does, ELECTRICAL WEST gets stories about the world's most advanced electrical field. ❧ Anyway, Rollo was happy. And his subscribers were happy. And when the fathers of the graduating engineering class saw the Engineer they knew their problem was solved. ❧ "Now see here, boy," they said to their sons. "These are hard times and I can't give you that yacht I promised. But I can do something I at least like better. I can help make you a success in life. I know what you've done this year: you've depended on the pictures and articles the Engineer reprinted from ELECTRICAL WEST for what you learned. So I'll give you a subscription to ELECTRICAL WEST. If that doesn't make you a good engineer then you damn well better go back to kindergarten because nothing ever will." ❧ Rollo, who's a smart guy, thinks there're a lot of other fathers who'd also like this subscription idea.


The Jobs you READ about
This FIRST
U. S. HOUSING PROJECT
"TECHWOOD"
AT ATLANTA, GA.
USING
TRIANGLE ELECTRIC METALLIC THIN WALL CONDUIT
. . . and here's why many others followed
EASIER TO WORK
(Quick to cut, bend, ream and couple)
EASIER TO FISH
(An inside finish that's as smooth as a gun barrel)
DEFIES CORROSION
(Hot galvanized---Inside and outside)
TRIANGLE PRODUCTS REWARD BUYERS!
TRIANGLE CONDUIT & CABLE CO., Inc.
Horace Harding & Queens Blvds.
ELMHURST, NEW YORK CITY, N.Y.
PACIFIC COAST DIVISION
C. C. Hillis, Vice-President In Charge of Sales
390 Seventh St., San Francisco, California
NEXT ISSUE
WEST SIDE
EXPRESS HIGHWAY
NEW YORK CITY
It MUST be right!

MOUNTING PROFITS

FROM MOVING AIR!

You can earn big profits by selling General Electric Air Circulators.

Everywhere, there will be a summer demand for devices that relieve oppressive summer heat. You can profit by supplying this demand with G-E Air Circulators! Quiet and economical, these low-cost Air Circulators offer lasting value—and they make lasting friends for you!

General Electric Air Circulators sell fast on demonstration. No complicated installation —just plug them in as you would an electric fan. You can sell a type of G-E Air Circulator for each and every purpose!

G-E Sales Aids to Help You Sell.

COOL COMFORT AT LOW COST
PROFITS GROW AS BREEZES BLOW
PROFITS FROM THE AIR
THERE'S A G-E AIR CIRCULATOR
Exactly suited to your needs
GENERAL ELECTRIC
Air Circulator

For: **Restaurants, Dress Shops, Night Clubs, Offices, Hospitals, Stores, Beauty Shops, Barber Shops, Laundries, Libraries, Dance Halls, Waiting Rooms and Homes.**

General Electric Air Circulators provide effective ventilation, and circulation. They drive out hot air and odors—and they pull in fresh, cool night-time air.

The *Deluxe* model is particularly suitable for locations exposed to public view. If the establishment is large, or if constant smoke and odors necessitate more frequent air changes, suggest the *Giant*. The *Utility* model is adapted to attic installations, ceiling suspension or floor use—its closed construction makes it safe.

For positive profits, handle General Electric Air Circulators! Write your General Electric Distributor today. Or mail the coupon to the General Electric Company!

GENERAL ELECTRIC
Air Circulator

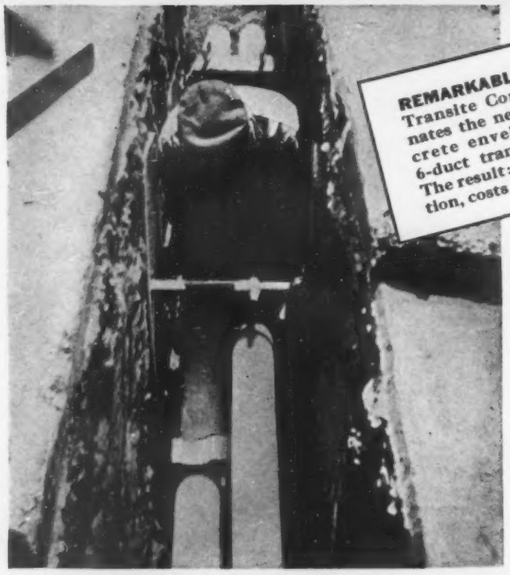
General Electric Company
Air Circulator Department
Division 3540
Bloomfield, New Jersey

Please send complete information on G-E Air Circulators.

Name ..... City .....

Street .....

EVERY TYPE OF DISTRIBUTION can be handled at Low Cost with J-M TRANSITE DUCTS



REMARKABLY STRONG, Transite Conduit eliminates the need for a concrete envelope on this 6-duct transmission line. The result: faster installation, costs sizably reduced.

Made of asbestos and cement, Transite Conduit and Korduct are incombustible, easily installed and remarkably resistant to corrosion

ABOVE GROUND or below ground...with or without a concrete envelope . . . J-M Transite Ducts are reducing installation and maintenance costs, and bringing greater permanence to electrical-distribution systems. These outstanding advantages are easily explained. J-M Transite Ducts are non-metallic, inorganic, made of a dense, tough composition of asbestos fiber and cement. They are incombustible, immune to electrolysis, exceptionally resistant to weather and corrosion. A permanently smooth bore permits

INSTALLATION SAVINGS, because of no "concreting-in," are even more important on single-duct distribution systems. In such cases, cost per duct-foot is cut to the bone.

PERMANENCE is assured because of Transite's inorganic composition. Made of asbestos and cement, it is unusually corrosion resistant. (The job shown below is another on which no concrete casing was required.)

NO CONCRETE ENVELOPE is needed on this multiple-duct Transite line. And, in addition to installation savings, Transite's incombustibility, inorganic composition and inherent permanence provide the maximum assurance of long, dependable service.

IN EXPOSED LOCATIONS Transite Conduit is weatherproof, fireproof, unusually resistant to corrosive fumes and gases. It needs no protective casing of any kind—will not rot or decay under any conditions.

long cable pulls with minimum effort, and without injury to sheathing.

Extra strength and resistance to corrosion make it possible to lay Transite Conduit *without a concrete envelope,* bringing substantial savings at installation. Where "concreting-in" is specified, the thinner walled Transite Korduct gives every advantage of Transite Conduit and saves on material expense.

These two J-M Ducts have made hundreds of distribution systems less expensive to install and maintain. Complete information is contained in Data-Sheet Manual DS-410. For your copy, write Johns-Manville, 22 E. 40th Street, New York City.

JOHNS-MANVILLE JM PRODUCTS

Johns-Manville

TRANSITE CONDUIT

for use underground without concrete envelope and for exposed locations

TRANSITE KORDUCT

for installation in concrete

INCOMBUSTIBILITY, again the result of Transite's asbestos-cement composition, is another outstanding advantage of this material. Heat dissipates rapidly through Transite, and cables operate at minimum temperature.

WHERE CONCRETE is specified, the thinner walled Transite Korduct saves on material costs. Yet it offers all the advantages of Transite Conduit—incombustibility, a permanently smooth bore and immunity to electrolysis.

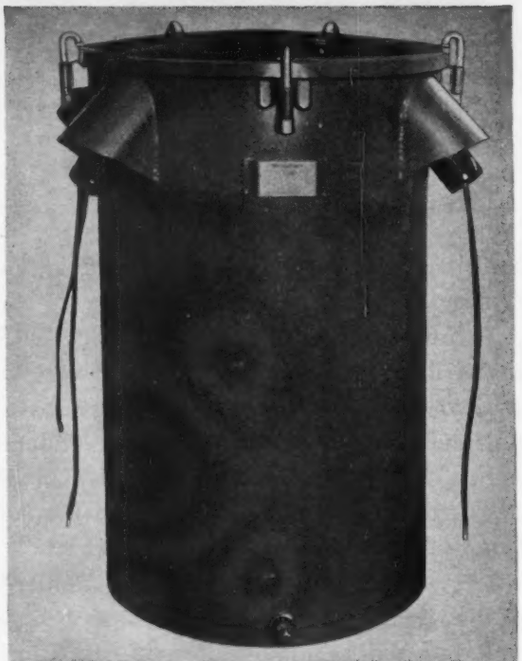
Depend on WESTINGHOUSE . . . for the UNSEEN SAFETY FACTORS In Modern Street Lighting

There's more to street lighting than visibility . . . as cities with modernized street lighting have discovered. Detroit with its new lighting installation, for example, has adopted Westinghouse Constant Current Regulators and Isolating Transformers as integral parts of its Saving-Lives-With-Light program. Officials of the Detroit Public Lighting Commission are assured of safety, high efficiency and trouble-free operation from their now-famous Detroit street lighting system.

The new Westinghouse Constant Current Regulator includes such important features as straight line current regulation, co-ordinated insulation, spring mounted mechanism, ball bearings at all moving points and cylindrical copper bearing steel tank. High insulation strength and unchanging current regulation are guaranteed by vacuum treatment of the unit after it has been assembled in its tank complete with oil. Because the current can be so accurately adjusted at the factory, no alteration of the regulating mechanism is necessary in the field.

The Isolating Current Transformer for each lighting unit is also an "unseen safety factor" vital to a series street lighting circuit. The combined isolating transformers and disconnecting potheads in the base of the lighting standards provide complete isolation from the high voltage series circuit and a ready means for disconnecting a single unit without an outage of the entire circuit. The new Westinghouse Type WDC transformer provides complete safety for servicing and testing.

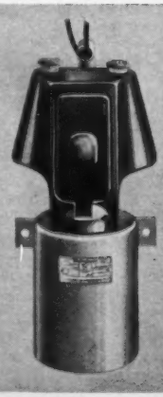
For complete details call your local Westinghouse Lighting Specialist, or address Westinghouse Electric & Manufacturing Company, Lighting Division, Edgewater Park, Cleveland, Ohio.



Illustrated above is the Westinghouse pole type Constant Current Regulator, Type CP. A subway type Regulator is also available.

★

The Westinghouse Reflectolux Sr. luminaire, designed for use with lamps up to 750 watts, has been widely adopted by municipalities as a solution to the deplorable rise in night traffic accidents. Reflectolux has a combination of new features that provide more light, less maintenance, greater flexibility and durability than have ever been offered in a street luminaire. Write for the new book, SAFETY WITH LIGHT.



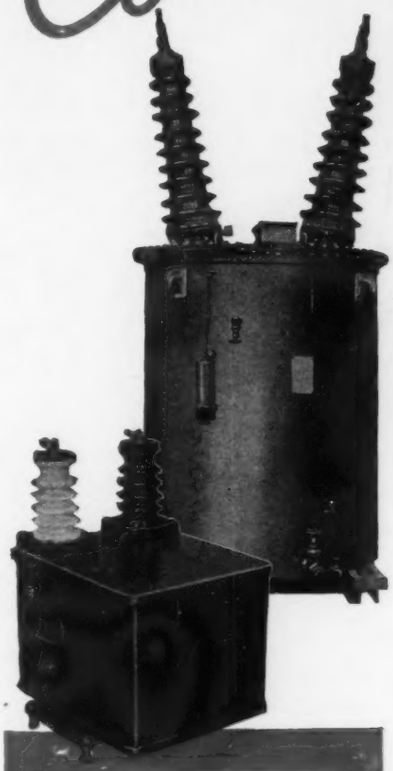
Westinghouse Type WDC Transformer provides a means of operating and insulating the efficient high current 15 and 20-ampere lamps from a 6.6-ampere series circuit.

WHEN YOU THINK OF *Lighting Equipment* THINK OF

Westinghouse

Co-ordinated to stay in service

THROUGHOUT THE ENTIRE LINE . . .



4 New WESTINGHOUSE ADVANTAGES

that give new low-cost metering.

1. **COMPLETELY CO-ORDINATED INSULATION** Co-ordinates surge-protection of all transformers with rest of system.
2. **NEW HIGH-ACCURACY CURRENT TRANSFORMER (FW)** Only two transformers needed to meter from 20 to 1200 amps.
3. **NEW POTENTIAL TRANSFORMERS (PT, PTO)** Designed to withstand extreme service conditions.
4. **QUICK-CHANGE CONSTRUCTION** of base and terminals simplifies transformer changes to meet varying loads.

J 70108

CONTINUAL replacement of instrument transformers, whether due to unusual overloads or because of damage from surges, is costly. But no longer need your instrument transformers act as "fuses" in the circuit! Westinghouse now gives you the means of meeting this problem with a complete line of instrument transformers, *co-ordinated* in surge-protection *to stay in service.*

Co-ordinated insulation—exclusive with the Westinghouse line—co-ordinates all Westinghouse transformers with proposed A.S.A. standards of insulation values. Co-ordination with your other apparatus or with your line protection stops outages from overvoltage and assures reliable, uninterrupted metering throughout the entire system.

Co-ordinated insulation offers new and important savings in transformer costs, inventory investment and maintenance expense. Get complete information on this important advance in instrument transformer practice from your Westinghouse representative—today!

SEND today for the new booklet describing the Westinghouse line of co-ordinated Instrument Transformers! Address Westinghouse Electric & Manufacturing Company, Dept. 7-N East Pittsburgh, Pennsylvania.

Westinghouse INSTRUMENT TRANSFORMERS

Co-ordinated to stay in service

High-Voltage Rubber-Insulated Submarine Cables

IN its specialized manufacturing experience of sixty years, The Okonite Company has made a large number and variety of rubber-insulated submarine cables. These cables cover all power voltages up to 35 kv. Installed under every condition of use, many of them have a background of very long service and have established a remarkable **performance* record.

Both Okonite insulation and our Okolite rubber compound have been used in the construction of these cables. As Okolite insulation is effectively resistant to corona, it is especially adapted for the higher voltages. It is also effectively resistant to moisture and heat and combines all of the essential electrical and mechanical qualities required for this class of work.

**This service record is of vital interest where purchases of rubber-insulated submarine cables are contemplated.*

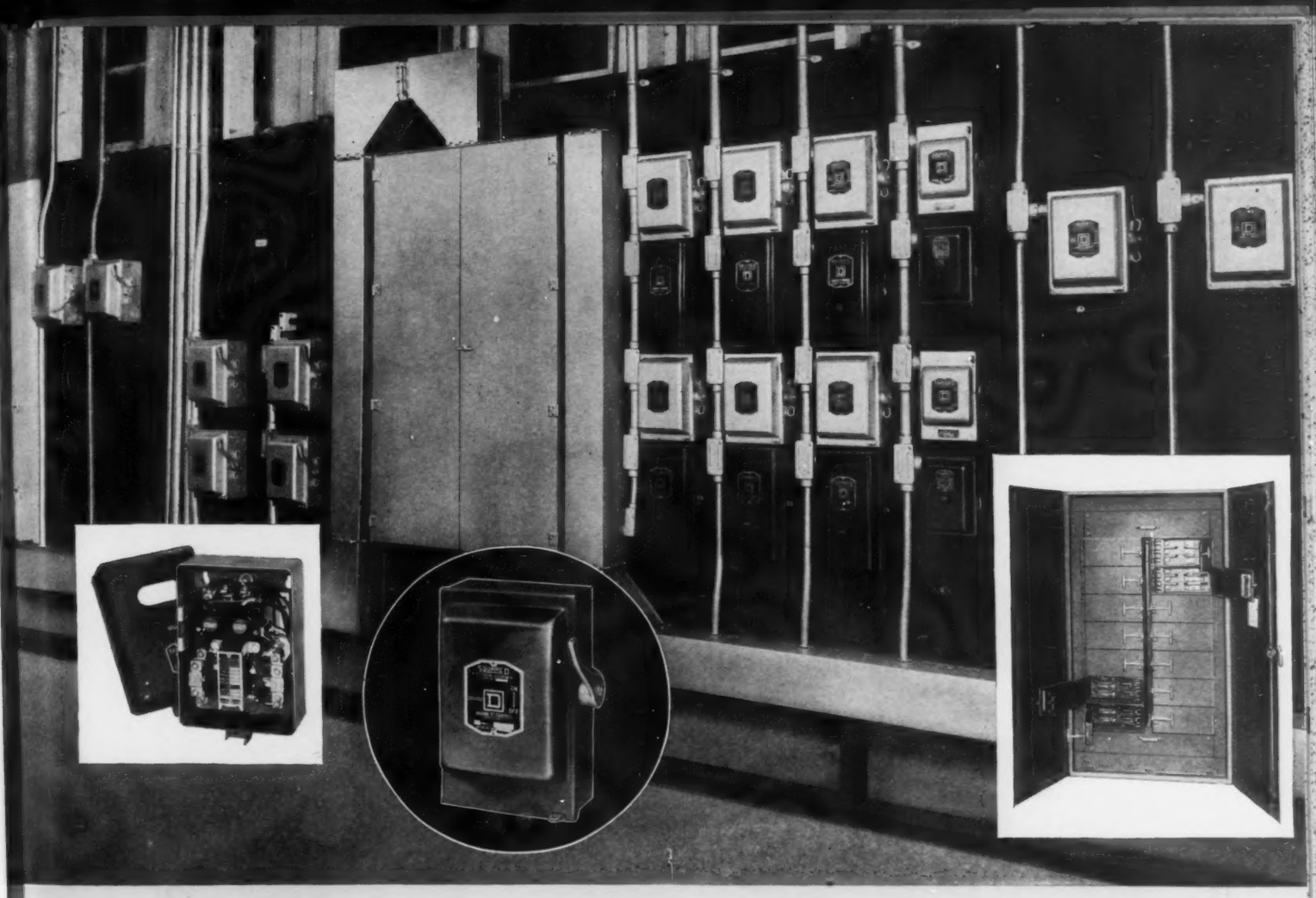
1938 Marks Our 60th Year of Service

THE OKONITE COMPANY

FOUNDED 1878

EXECUTIVE OFFICE: PASSAIC, NEW JERSEY

OKONITE QUALITY CANNOT BE WRITTEN INTO A SPECIFICATION



A NICE JOB • • BY A GOOD CONTRACTOR • • ALL SQUARE D • • POWER PANEL • • SWITCHES AND MOTOR CONTROL • • WIRED THROUGH SQUARE-DUCT

● Here is an installation of Square D electrical equipment that an electrical contractor and the factory owner can be proud of for its neatness and efficient layout.

It is ALL Square D. It received much favorable comment from inspectors and industrial plant engineers. It made a reputation for the contractor. The Square D line is complete—uniform in quality and includes all equipment for power distribution and motor control in the industrial plant—switches, power and lighting panelboards, circuit breakers, motor control and SQUARE-Duct . . . Square D electrical equipment is available through electrical wholesalers everywhere.

CALL IN A SQUARE D MAN

SQUARE D COMPANY

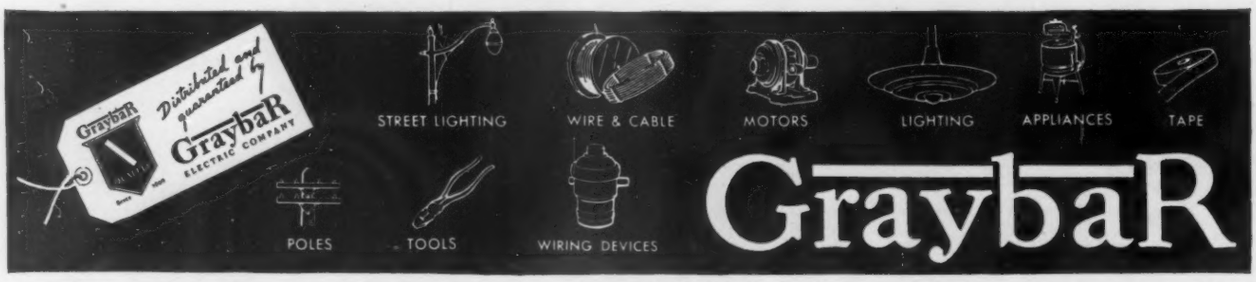
LOS ANGELES - MILWAUKEE - DETROIT

IN CANADA: SQUARE D COMPANY CANADA LIMITED, TORONTO, ONTARIO

GRAYBAR takes pride in the completeness of its service of electrical supplies—a service to the whole community. Every electrical need of industry, office, and home can be filled from Graybar's list of 60,000 electrical items.

At the same time, nearby Graybar warehouses make these electrical products quickly and conveniently available...when and where you want them. And Graybar's 69 year reputation for quality assures dependability in every electrical product.

Finally, Graybar's service of distribution saves buyers' energies and time...makes heavy reserve stocks unnecessary...coordinates delivery and assembly of stocks. Call on Graybar ...for *everything electrical!*



OFFICES IN 85 PRINCIPAL CITIES EXECUTIVE OFFICES: GRAYBAR BLDG., NEW YORK

New-SENSATIONAL SELECT-A-SPEED CALROD

SENDS COOKING COSTS TO AMAZING NEW LOWS!

STANDARD EQUIPMENT—Select-A-Speed Calrod is standard equipment on each new 1938 Hotpoint Electric Range, except model RA158.

5 COOKING SPEEDS—Intense High Speed, Half, Quarter, Thrift, Warm. Easier than tuning your radio.

REMOVABLE PANS—Quickly and easily removed, in two sections, for cleaning. An exclusive feature of Select-A-Speed and Standard Calrod.

8% MORE SPEED THAN EVER BEFORE!

Hotpoint gives you the outstanding electric range selling feature of the year in Select-A-Speed Calrod—revolutionary new cooking unit that shatters all former records for cooking speed and economy.

Here are the facts:

5 COOKING SPEEDS—Exactly the right heat for every cooking need. SPEED (1300 watts) new, intense High heat to start foods cooking quickly. HALF (650 watts) for fast frying and sauteing; also deep fat frying. QUARTER (325 watts) for slow frying, and boiling. THRIFT (160 watts) maintains a gentle boil. WARM (80 watts) keeps foods and beverages at correct serving temperatures, without scorching or drying out their luscious goodness.

FASTER—Select-A-Speed's 1300 watt HIGH heat has 8% more speed than conventional 1200 watt units.

TIME-RELEASING—Less watching and stirring.

ECONOMICAL—For example: 64% saving of electricity in cooking rice and milk, compared to the double boiler; 42% to 47% saving in cooking dried fruits; 20% to 30% saving in cooking most vegetables.

Translate these facts into terms of your business. Think of the advantage they give your salesmen in winning interest in electric cookery, and closing more sales *faster*. Get the full story of Select-A-Speed. Don't delay. See your Hotpoint distributor today.

Edison General Electric Appliance Co., Inc.
5612 W. Taylor St., Chicago, Ill.

THE SALISBURY

Hotpoint's popular built-to-the-floor model. Full porcelain enamel, one Select-A-Speed Calrod, two Standard Hi-Speed Calrod Units. Thrift Cooker. Deluxe Lamp and white Condiment Set. Moderne Timer-Clock with built-in Time Chime. Warming Compartment.

The Mark of a Dependable Dealer

Hotpoint ELECTRIC RANGES

REFRIGERATORS · ELECTRIC WATER HEATERS
DISHWASHER-SINKS · WASHERS AND IRONERS

Now!

MONARCH PRESENTS ANOTHER EXCLUSIVE SELLING FEATURE...

he Monarch *DEEP HEAT* Saucepan

s new, sure-fire **MONARCH** electric range feature, the *Deep-Heat* ce Pan, will help you sell ranges. It's a time-and-money-saving hod of electrical cooking, designed to answer the housewife's and for economy, convenience, and uniform heat.

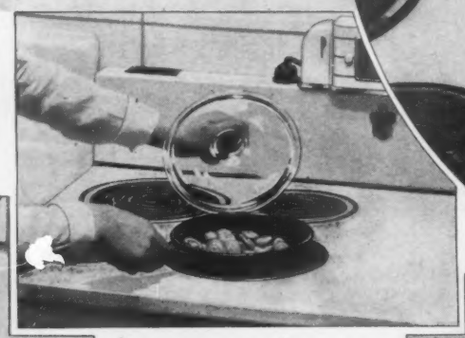
his 2½-Quart Electrical Sauce Pan Unit snugly replaces a standard ace unit, applying heat to both sides and bottom, cooking fast and nomically. Housewives are quick to see the advantages of this ilt-in", double-heat unit that is imbedded in the top surface to p the streamlined beauty of the **MONARCH** design.

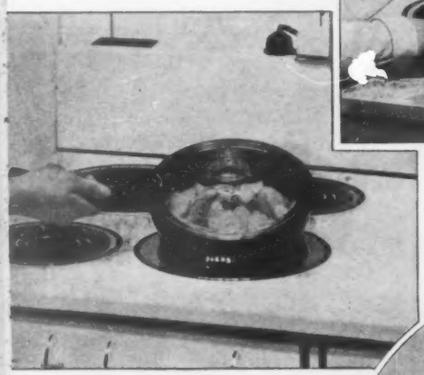
's an all-purpose utensil, perfect for every surface cooking opera- —steaming, boiling, baking, deep-fat frying, waterless cooking, for re- ting pre-cooked and canned foods and all regular sauce pan uses.

's one more of the exclusive **MONARCH** features that sell ranges, build fits for you and produce satisfied customers. Cash-in on this exclusive NARCH feature. Write today for literature, photographs and prices.

DEEP-HEAT SAUCEPAN is interchangeable with standard surface unit. Consists of 2½ qt. porcelain enamel saucepan inset fitted into stainless steel insulated well. It's simple to remove, easy to clean, quick to use. Optional equipment on every MONARCH RANGE model—new or old.

TAIN, NO SCRUB with MON- H'S deep-heat saucepan. House- approve this 2½-qt. porcelain el utensil that protects both pan ood from discoloration.

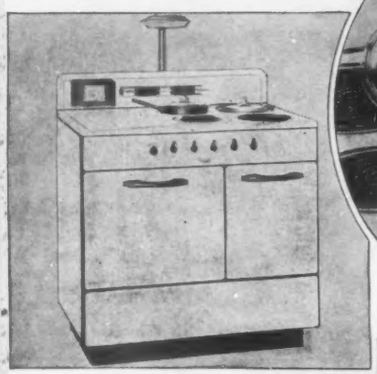




↑ PYREX GLASS fitted cover is standard equipment with MONARCH Saucepan. Affords visible cooking plus the most sanitary of all covers.

↑ BUTTER-BOIL VEGETABLES Steams, bakes, boils, fries or butter-boils your favorite vegetables quickly and without loss of flavor.

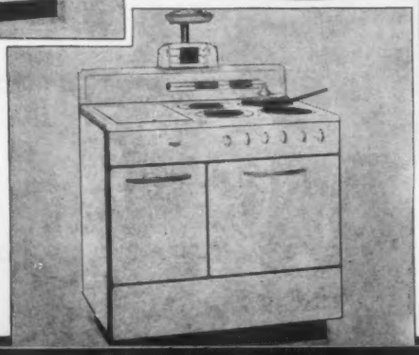
STEAM POTATOES in 15 minutes! This saucepan's insulated, stainless steel cooking well conserves and holds heat in the cooking area.



↑ FRYING made easy with MONARCH'S deep-heat saucepan. A separate element on the bottom of pan concentrates heat, requiring shorter cooking time. Also very satisfactory for *deep fat frying.*

← PRE-COOKED OR CANNED FOODS are made more delicious with MONARCH'S electrical saucepan. This double-heat method saves time and flavor.

D STANDARD EQUIP- MENT ON MONARCH ANGES FC57L and FC- 47L, the new deep-heat aucepan with Pyrex cover s optional on *every* MON- ARCH model—new or ld. Above models equip- ed with 17" oven, elec- ric timer-clock, oven tem- erature control. Closed op units, optional. FC57L as 10-qt. Roaster; FC47L as 6-qt. Cooker.



MALLEABLE IRON RANGE COMPANY

35 North Lake Street, Beaver Dam, Wisconsin

FREE TO ONE OF YOUR CUSTOMERS... A WHITEHEAD MONEL KITCHEN

...AT OUR EXPENSE

Put on a big sales-building contest. Read the quick facts and take advantage of the free offer below.

Take your choice of these two Monel kitchens.

GIVE away... absolutely FREE... a smart up-to-the-minute, model Monel* kitchen! Attract crowds of eager prospects! Make your showrooms the headquarters for electric kitchen equipment in your community!

Open to all of your customers and prospects. No entrance fee. Nothing to buy. *The winner gets a beautiful new Whitehead Work-Saving Kitchen with lustrous sink and shining work surfaces of silvery Monel*... AT OUR EXPENSE.

What a break for you! You *buy* one kitchen... we give you another, free. You make your showroom the big center of attraction. You display your appliances in a real kitchen atmosphere. You create interest in your whole line... especially in quality electric appliances. You give away FREE a complete new kitchen, and get the benefit of the attendant excitement and publicity.

Take advantage of a million dollars' worth of National Advertising. Feature Whitehead and Monel products that are advertised consistently in top-notch magazines reaching more than ten million readers. Act now... mail attached coupon.

THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street, New York, N. Y.
Send me full details about the Monel Kitchen Contest and your FREE offer.

Name _____

Address _____

EW 5-38

THE INTERNATIONAL NICKEL COMPANY, INC., 67 WALL ST., NEW YORK, N. Y.

* "Monel" is a registered trade-mark of The International Nickel Company, Inc., which is applied to a nickel alloy containing approximately two-thirds nickel and one-third copper.

INCO MONEL

EXTRA SALES . . .

ENSEMBLE BUYING! — the idea that causes a woman to buy hat, dress, hose, shoes and handbag in a planned relationship. Or bangles, bracelet and brooch. Or chair, side table, rug and drapes. She uses the ensemble idea when she sets her dinner table — or plans a supper party.

How natural for this prospect to think of kitchen appliances in *planned relationship!* Her home laundry, too. Westinghouse ELEC-TRI-Center Kitchen and Complete Planned Laundry are sales ideas she understands, whether she buys one item at a time, or all of them.

She knows that ensemble buying gives her all the values of each individual purchase PLUS harmony of appearance, step-saving, time-saving, money-saving and greater all-around satisfaction, at no extra cost — the results of *planned relationship.*

Westinghouse dealers know that ensemble selling delivers this important extra something-for-nothing, and means additional sales, larger sales and repeat sales.

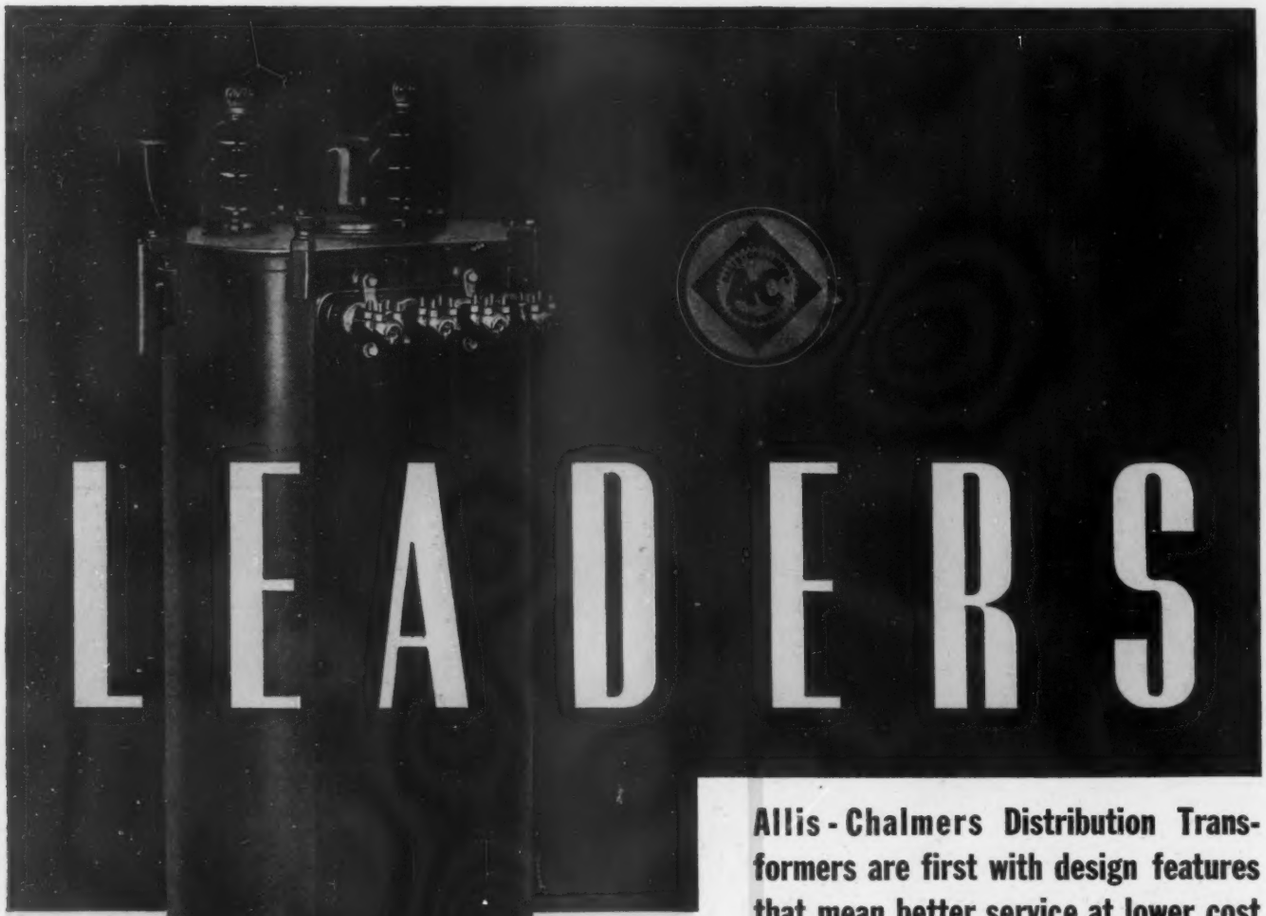
Get the details from your Westinghouse man, or write Department 876.

WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY
MERCHANDISING DIVISION • MANSFIELD, OHIO

VERY HOUSE NEEDS **Westinghouse**

wrapped up for you

"The Line of Least Resistance"



LEADERS

Allis-Chalmers Distribution Transformers are first with design features that mean better service at lower cost

Surge-protected design since 1929. First in the field with this feature that has since become general practice.

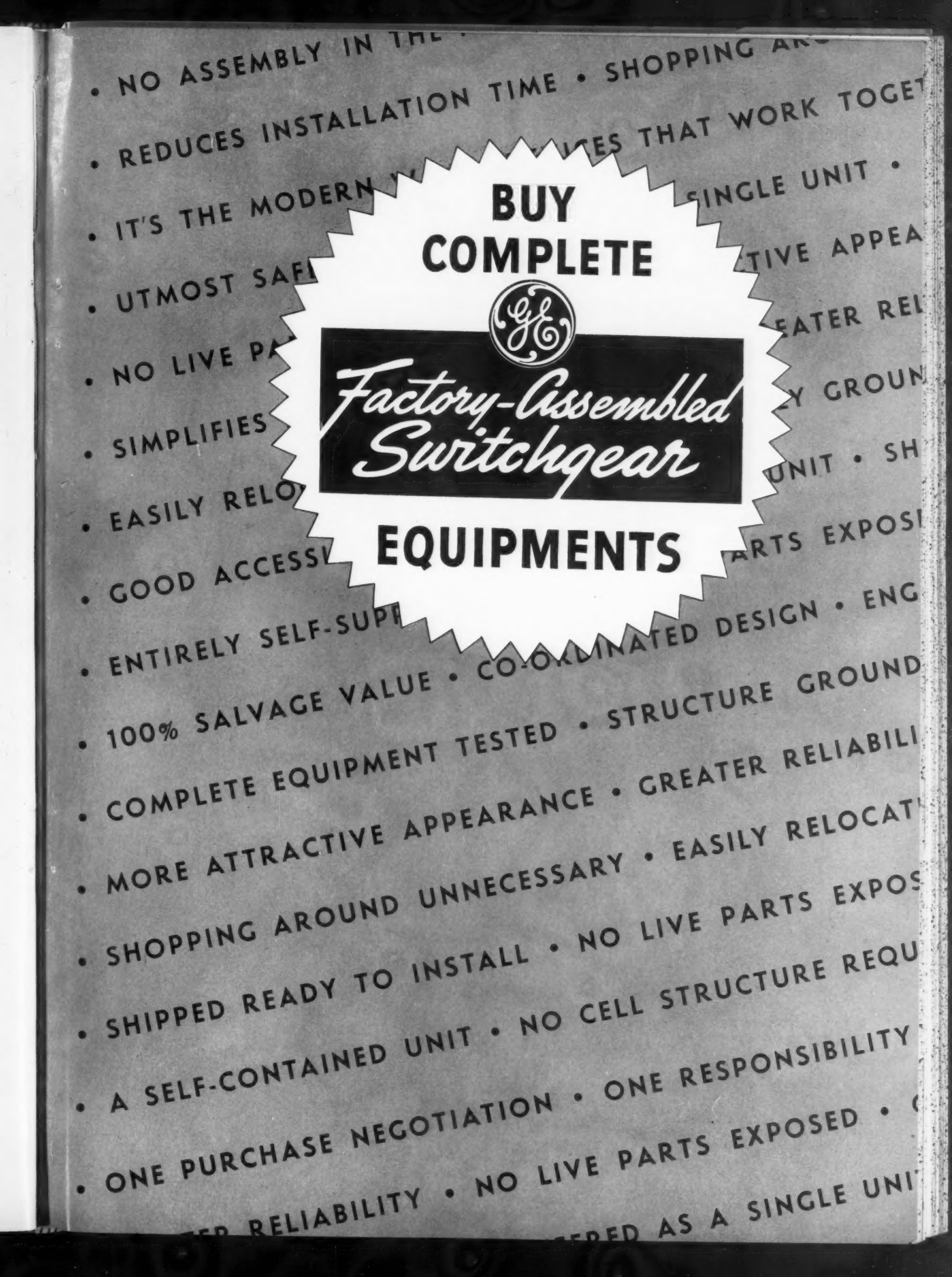
Solderless Connectors and Stud Bushings since 1929. First in the field with this feature that has since become general practice.

Bushing Coordination—since 1933. First in the field with this feature that has since become general practice.

First in many other important features that have since been accepted by the industry as general practice—Allis-Chalmers offers the utmost in Distribution Transformer value.

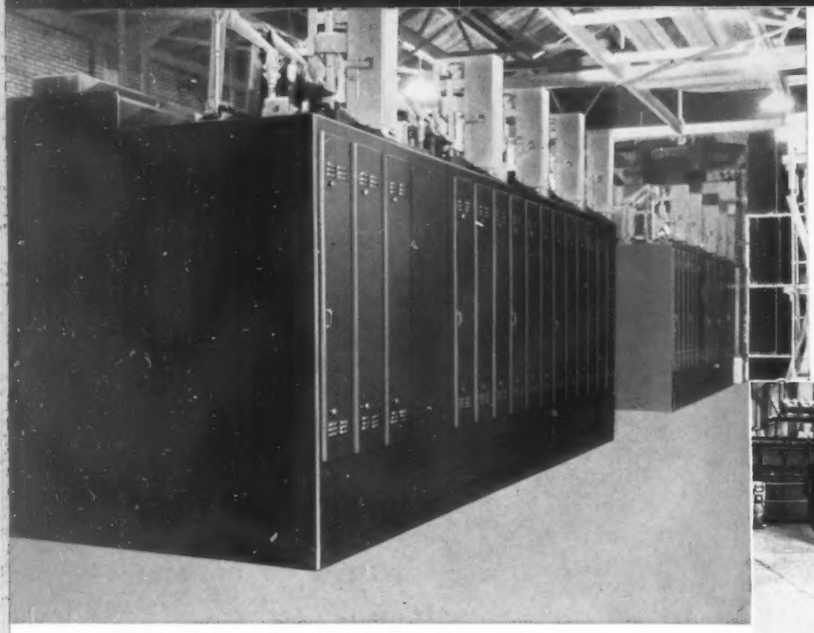
When you specify Allis-Chalmers Distribution Transformers you buy Allis-Chalmers specialized transformer engineering and decades of service experience—plus proven excellence of manufacture. You get transformers that fit into your operating practice and are readily adaptable to changing service and load conditions. Because of these "first features" you always get your money's worth—plus! Specify Allis-Chalmers.

TRANSFORMER DIVISION
ALLIS-CHALMERS
MILWAUKEE·WISCONSIN


BUY
COMPLETE
Factory-Assembled
Switchgear
EQUIPMENTS

MODERN SWITCHGEAR

Present and Future



FOR MAIN-STATION AND SUB-STATION SERVICE

FH Cubicles — up to 34.5 kv, and 1,500,000 kva. This is the most advanced type of installation of the FH oil-blast breaker. Includes disconnecting switches, mechanical interlocks, buses, and necessary current transformers.

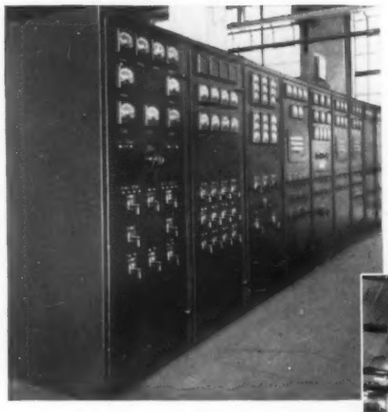
MI-6 Metal-clad Switchgear — up to 15,000 volts and 500,000 kva. Has the exclusive feature of easily removable breakers. Includes a stationary housing, mechanical interlocks, buses, and disconnecting devices.

SWITCHGEAR that is built and shipped as a unit is practically ready for operation the minute that it arrives at your door. You avoid expensive construction delays — the inevitable result of piecemeal buying — and you save on installation costs.

Even more important, you are assured of absolutely reliable operation, because a single responsible manufacturer has designed the whole equipment — a co-ordinated unit — all devices designed to work together.

Years ago, General Electric resources were put behind the development of metal-enclosed equipment — switchgear that could be shipped as a unit and installed as you do a motor. Today the trend is unmistakable. This is a NEW day in switchgear. Engineers are demanding metal-enclosed units. G-E designs are available for every switching job. General Electric Co., Schenectady, N. Y.

BUY COMPLETE GE Factory-Assembled Switchgear EQUIPMENTS



FOR SECONDARY CONTROL

Duplex Control Switchboards. Control and indicating instruments are on front hinged panels; meters and relays on rear hinged panels.

FOR STATION AUXILIARIES

Air-circuit-breaker Switchboards—for 600 volts up to 10,000 amperes. Draw-out-type breakers for easy and safe inspection.

GENERAL ELECTRIC

890-65

VARNISHED Cambric Insulated Cables are showing superior advantages in many cases where loads have been increased. This type of insulation has the ability to withstand continuous high temperatures without deterioration, and it is not injured by contact with insulating or lubricating oils or greases. For these reasons it has become widely used for apparatus cables, and motor and generator leads where heat, high voltage and the effects of oil would shorten the life of rubber insulation.

American Steel & Wire Company Varnished Cambric Cables are available in either braided or lead sheathed insulation and are suitable for service up to 10,000 volts, and higher if lead sheathed or properly shielded.

For applications where heat resistance is of primary importance we have developed a special type of Varnished Cambric Cable which is even more resistant to continuous high temperatures than the standard type. Inquire about our "high-temperature" varnished cambric.

Loads have been increased and may be increased further. We will be glad to show you how our Varnished Cambric Cables can be of economical assistance to you.

VARNISHED CAMBRIC INSULATED CABLES

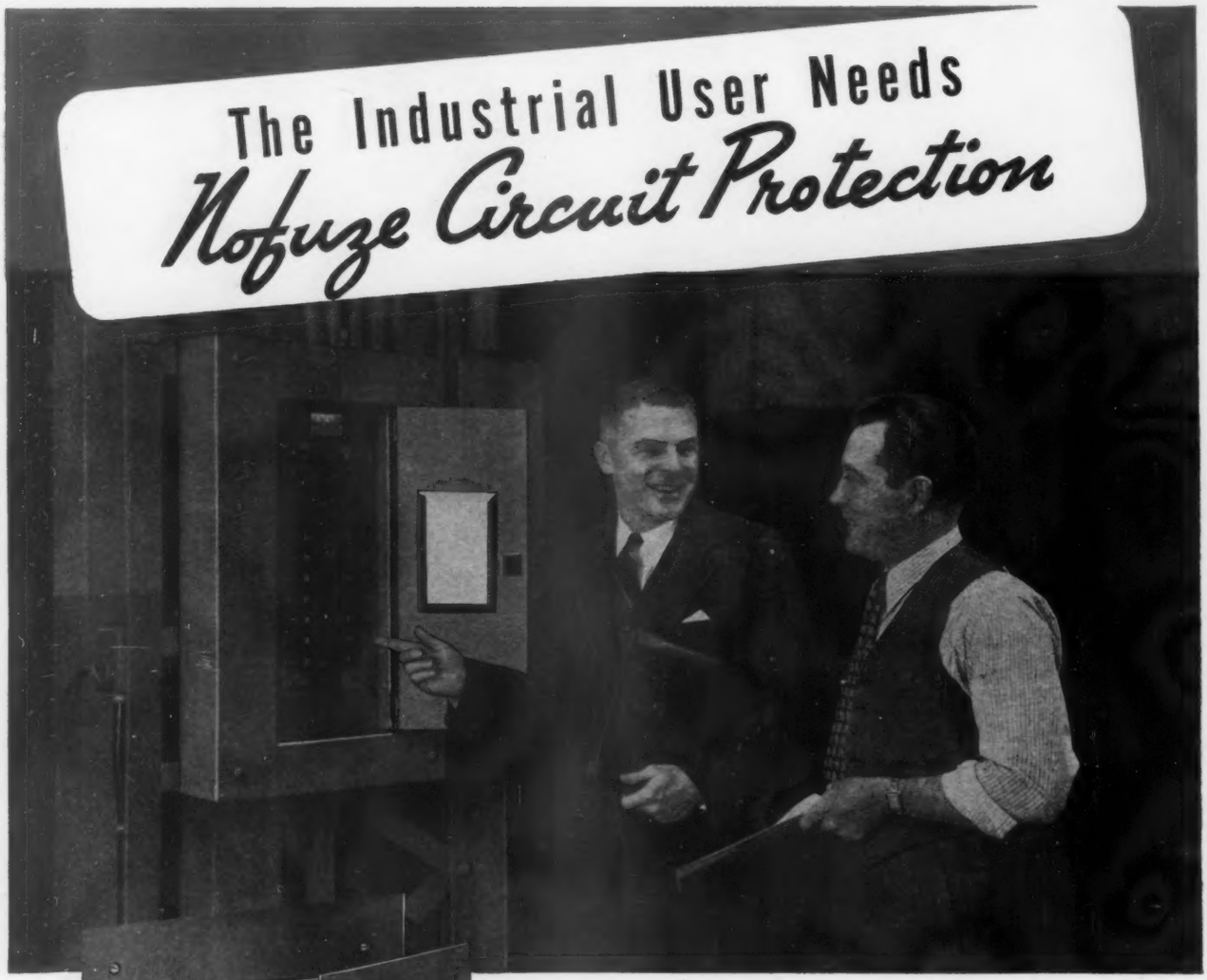
COLUMBIA STEEL COMPANY · *San Francisco*

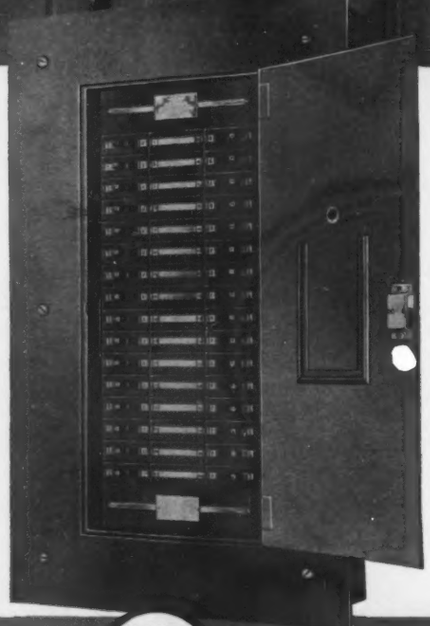
Pacific Coast Distributors of Varnished Cambric Insulated Cables for American Steel & Wire Company

United States Steel Products Company, New York
Export Distributors

UNITED STATES STEEL

The Industrial User Needs *Nofuze Circuit Protection*





Overloads are bound to occur in industrial plants. And when they interrupt operations, not only is the power load lost, but the customer's satisfaction with electric service is disturbed.

Westinghouse Nofuze equipment — switchboards, distribution panelboards and oil immersed panelboards prevent much of this lost load and customer dissatisfaction. They are calibrated to ride through momentary overloads without interrupting the circuit. Yet they clear sustained overloads — trip instantly on short circuits.

Power sales engineers who contact industrial users will be interested in a new booklet, "Proved in Over 2½ Million Circuits," giving the facts about Nofuze circuit protection. Copies are now available for the asking. Ask your nearest Westinghouse sales office or wholesaler.

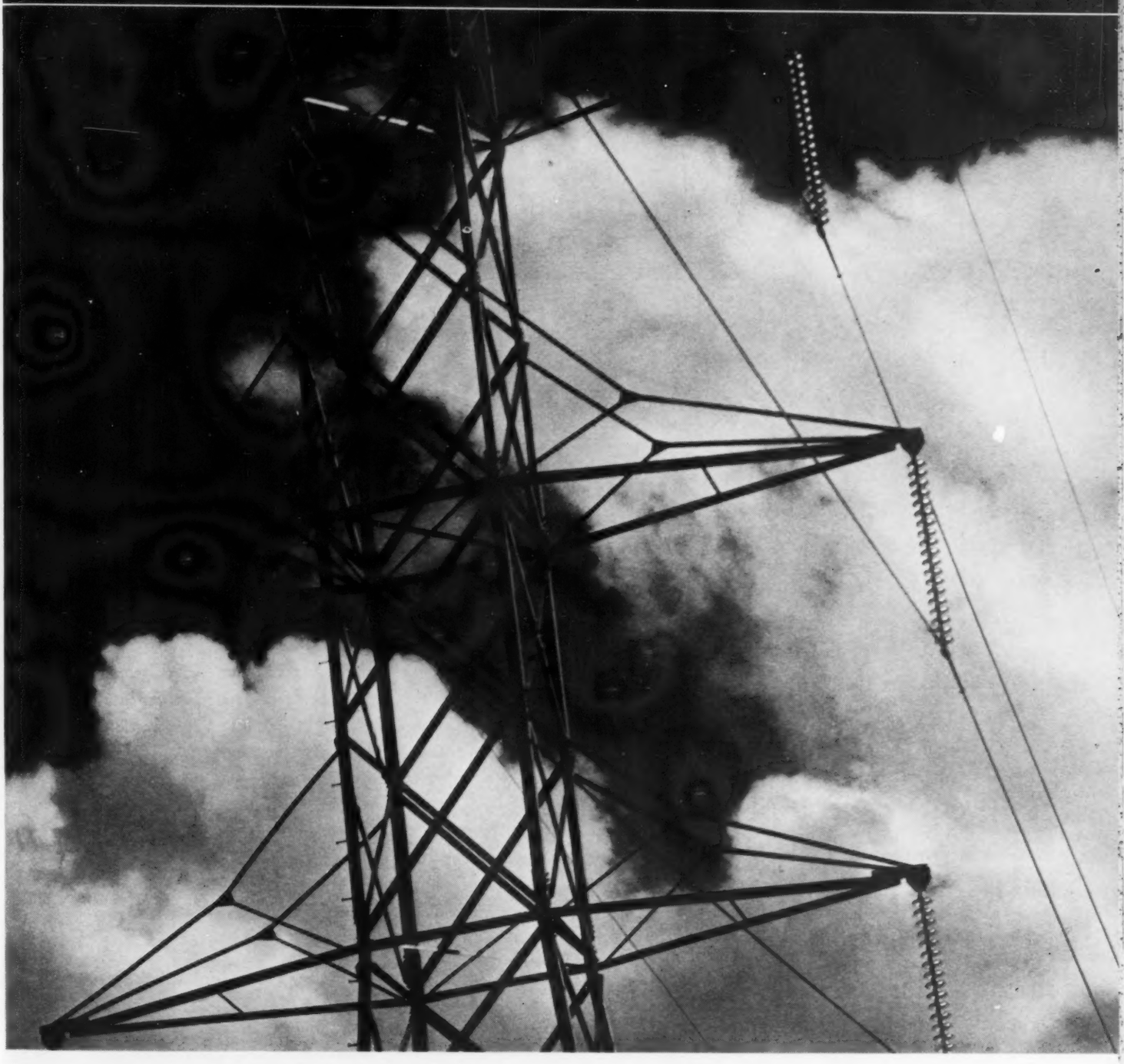
WESTINGHOUSE ELECTRIC & MANUFACTURING CO.
EAST PITTSBURGH, PA.

J 60212

Westinghouse

NOFUZE CIRCUIT PROTECTION

154,000 volts—on its way to beat an egg!



THERE it goes! A cataract of power on its way to village, city and farm, frequently from a source hundreds of miles away.

Soon it will be "stepped down" to do a thousand and one jobs, from welding together a streamlined train, to beating an egg for Johnny's custard...and for pennies, too! For since 1920 the average cost of electricity for household use has dropped from 7½¢ to 4⅓¢ per kilowatt hour. From the day Corning blew a thin glass bubble for Edison's first incandescent lamp, Corning has played a useful part in the advance of electric service.

Today, because of their high electrical values and greater mechanical strength, Pyrex power insulators are used in high voltage transmission lines. "Pyrex" brand glass in lightning arresters guards against current interruptions. It is even used in the fuses that protect wiring against "overload".

Corning knows glass, for glass is Corning's only business. Glass objects of art, handmade by Steuben craftsmen, examples of which are in the Metropolitan Museum of Art. Glass for the world's largest telescope mirror. Glass in the form of miles of sturdy crystal pipelines for food and chemical industries. Glass as Pyrex Ovenware and Flameware, and in slender, cottony fibres for fireproof house insulation! Glass research in America began at Corning. Write for free copy of "Corning Glass Works presents..." Corning Glass Works, Corning, N. Y.

CORNING

means

Research in Glass

FIFTY YEARS OF 1888 1938 INSTRUMENT LEADERSHIP

TODAY

Weston is 50 years young!

THIS month, the Weston Electrical Instrument Corporation begins its second half-century of leadership in electrical measurement. Naturally, it is an occasion justifying legitimate pride and self-satisfaction.

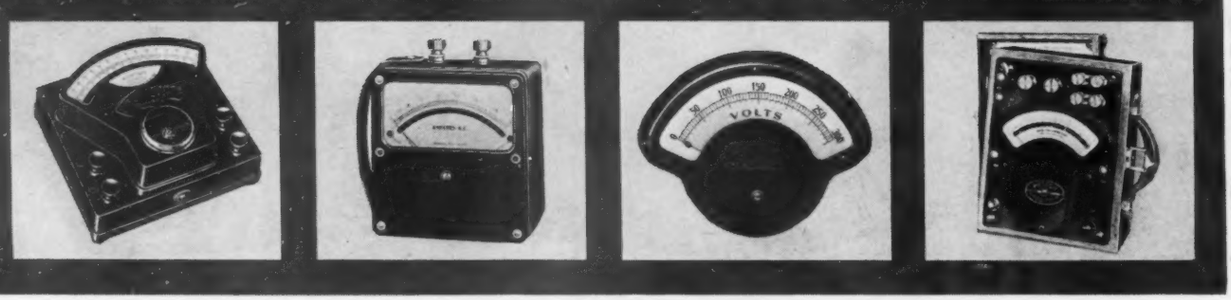
Yet, for this very reason, fifty years can be a dangerous age. The temptation to dwell upon past achievement can harden the arteries of progress. At fifty, the will to challenge tomorrow's needs and tomorrow's difficulties vigorously and open-mindedly—as a youth with *nothing to lose* would challenge them—frequently grows weak.

There is one very good reason, however, why the beginning of a new half-century still finds Weston a typically *young* organization in its attitude toward new industrial wants, new methods for meeting them, and new techniques of manufacture. From the time when Dr. Weston sketched the design for the first Model 1 instrument, *pioneering became a deliberate Weston policy.* Before the phrase "industrial research" came into the language, *Weston engineers were busy at it!*

Now, after fifty years, pioneering has become an ingrained habit at Weston—unaffected by the rush demands of boom-times or the curtailments of leaner periods. So far this year, for example, four fundamental instrument improvements are going into production. Three more are in the test stage. A half-dozen others are on the drawing boards of the engineering department.

That is why, at the half-century mark, Weston is not stopping to "point with pride" at what *has* been accomplished in its first fifty years. Rather, we ask with a youthful enthusiasm we see no reason to suppress: Watch what Weston *is* doing . . . will *continue* doing . . . all during the next! . . . Weston Electrical Instrument Corp., 577 Frelinghuysen Avenue, Newark, N. J.

WESTON *Instruments*



PACIFIC COAST REPRESENTATIVES

Eicher & Bratt,
263 Colman Bldg.
Seattle, Wash.

Herman E. Held,
420 Market St.
San Francisco, Calif.

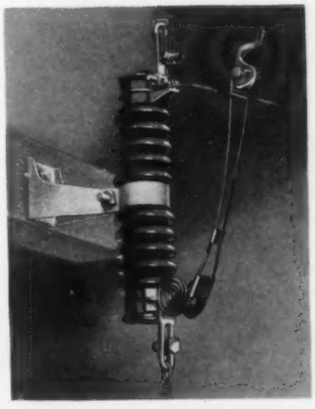
A. A. Barbera,
Subway Terminal Bldg.
Los Angeles, Calif.

ASSURE GREATER CONTINUITY OF SERVICE WITH JAMES R. KEARNEY Products

"That's how we cut costs .... Kearney Trip-O-Links on poles — no crossarms — and Con-Nec-Tap Clamps for quick, sure connections."

We have Economized by Changing to Trip-O-Links

— better rural service — fewer patrols since we've installed these switches



Here's the new, inexpensive Kearney Trip-O-Disconnect — available in 5000, 7500/12,500 Y, 15,000 Volts, 50 Amperes — a practical switch fully guaranteed to give satisfactory performance.

"OUR OPERATING COSTS on cheap rural lines were getting higher ... customers weren't satisfied ... we were jeopardizing our safety practices. ... Then we tried Kearney Trip-O-Links ... Better service—less patrols — greater safety and fewer maintenance problems were the immediate apparent results."

This is the sort of experience that many operators have had during the past several years. They have found that they can get exceptional and dependable performance from Kearney Trip-O-Link switches on rural constructions where capacities — and budgets—are limited ... They have seen how this switch of revolutionary design effects greater safety, more positive operation and greater continuity of service — inexpensively and conveniently.

Investigate the possibilities of adopting Trip-O-Links to your own rural constructions. See how they can help you cut operating costs ... Write for information today—or, try them on your lines and see for yourself their many advantages.

MANUFACTURED BY
JAMES R. KEARNEY CORPORATION
4224-42 CLAYTON AVE. SAINT LOUIS, MO.

Exclusive Sales Representatives

MAYDWELL & HARTZELL
INCORPORATED
LOS ANGELES • SAN FRANCISCO • PORTLAND

EXCLUSIVE DISTRIBUTORS
GRAYBAR ELECTRIC CO., Seattle, Portland, Tacoma, Spokane • WESTINGHOUSE ELECTRIC SUPPLY CO., Phoenix • J. R. BRADLEY CO., Reno

C·S·P Means Positive Protection from Lightning

Now the *proved* way to wipe out the cost of transformer repairs and replacement due to lightning, is to install CSP Transformers.

Operating records on thousands of CSP Transformers now in service prove definitely that most transformer failures from lightning *can be eliminated.*

Elimination of the annual lightning tax is only one of the reasons why CSP Transformers can enable you to *set a new low mark in distribution operating costs.* Ask your Westinghouse representative for complete information or send for Booklet 2042-A. Westinghouse Electric & Manufacturing Company, Department 7-N, East Pittsburgh, Pennsylvania.

Cover Bushing
CSP Transformer

ONLY C·S·P TRANSFORMERS ARE:

1. Completely Self Protected against lightning — no fuses to replace.
2. Completely Self Protected against burnouts from short circuits.
3. Completely Self Protected against burnouts from overloads.

PLUS

4. Simple, low-cost installation; maintenance expense low after installation.

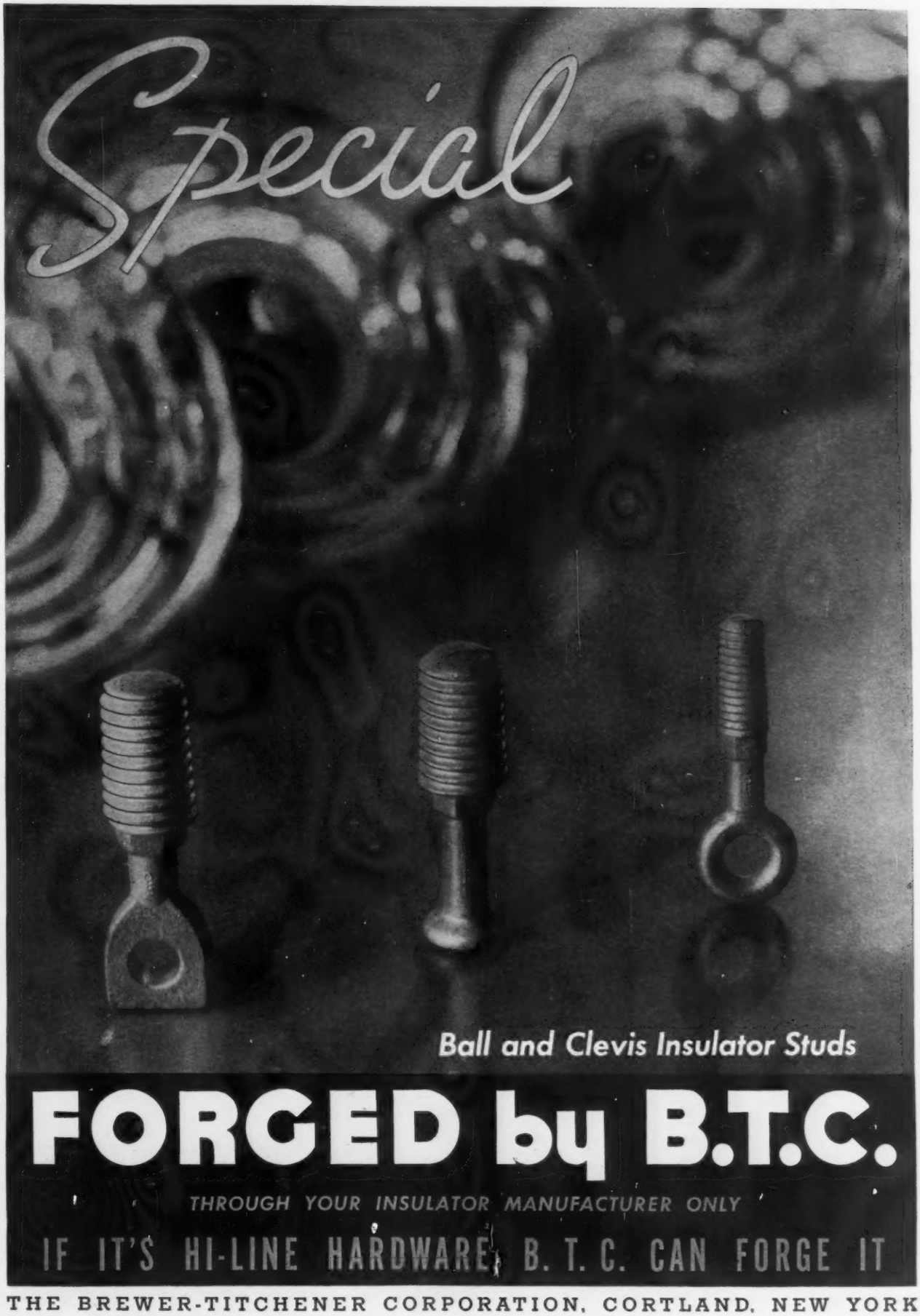
Pocket Bushing
CSP Transformer

J-70122

WESTINGHOUSE ELECTRIC

Westinghouse

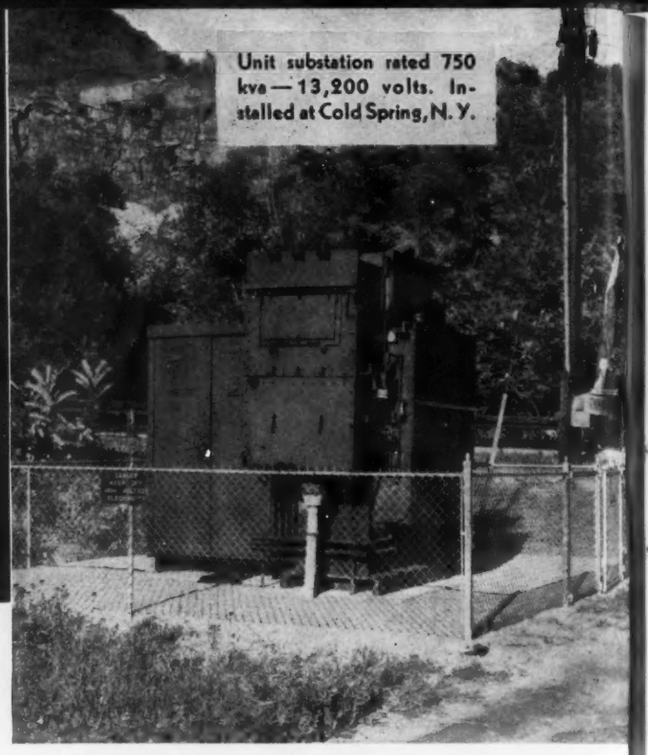
Completely SELF PROTECTING TRANSFORMERS


Special
Ball and Clevis Insulator Studs
FORGED by B.T.C.
THROUGH YOUR INSULATOR MANUFACTURER ONLY
IF IT'S HI-LINE HARDWARE, B. T. C. CAN FORGE IT
THE BREWER-TITCHENER CORPORATION, CORTLAND, NEW YORK

SAVE

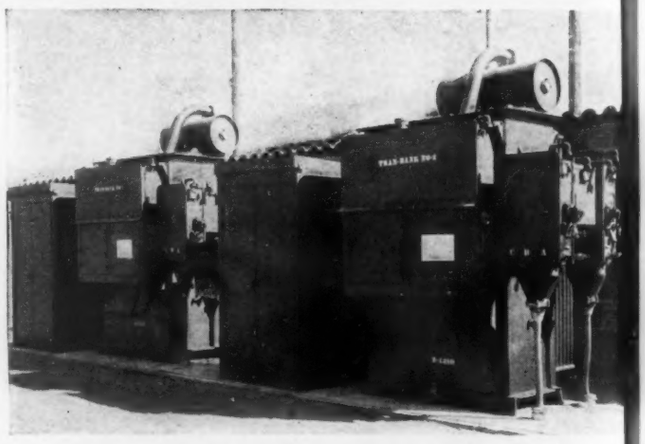
WITH UNIT SUBSTATIONS

SAVE system investment—real estate—taxes—layout time—and reduce construction and installation time. Here are a few G-E unit substation installations where these savings have been obtained. Your system, too, may present similar opportunities. General Electric Company, Schenectady, N. Y.

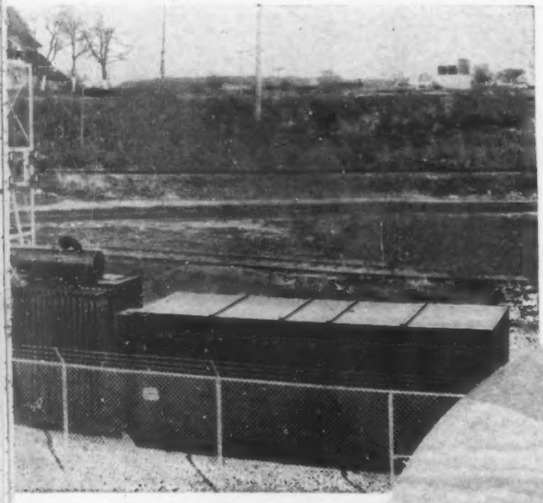


Unit substation rated 750 kva—13,200 volts. Installed at Cold Spring, N. Y.

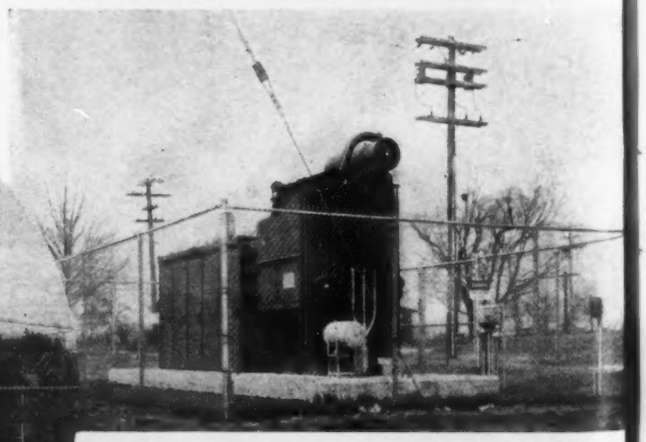
Below Right—
Two unit substations, each rated 1250 kva—13,800 volts. Installed at El Paso, Texas.



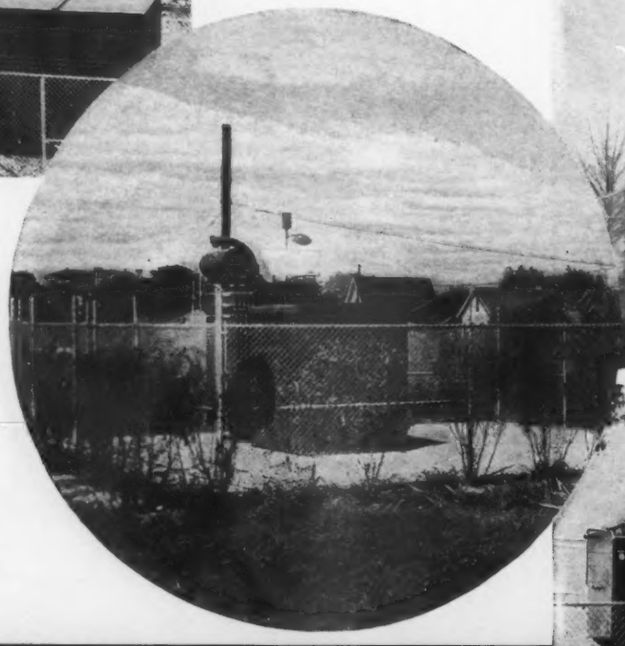
Center Right—
Unit substation rated 1500/2000 kva—33,000 volts. Installed at Indianapolis, Ind.



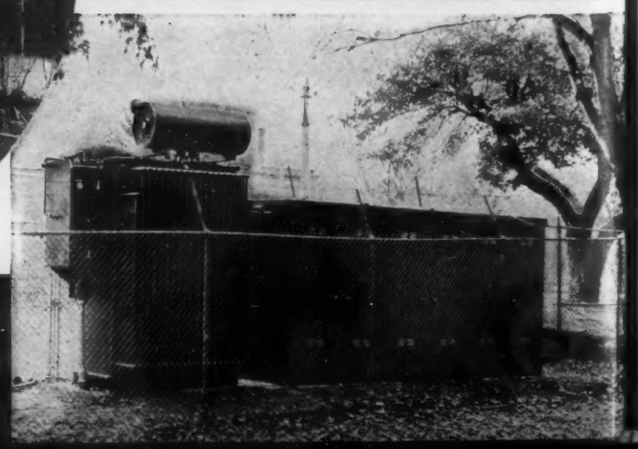
Lower Right—
Unit substation rated 1500 kva—11,000 volts. Installed at Rochester, N. Y.



Unit substation rated 1500 kva—13,800 volts. Installed at Aurora, Ill.



Unit substation rated 1500 kva—13,800 volts. Installed at Louisville, Kentucky.



GENERAL ELECTRIC

310-25

ELECTRA'S HUSBAND

Confounding the Game of Gossip

"DEARIE, you haven't heard the half of it." Electra was in the midst of one of her interminable telephone conversations and some feminine member of the community was on the pan. I gave little attention to the one-sided conversation but did do some reflecting on the subject of gossip.

It's probably true that women have the worst reputation for this particular evil (Electra would debate this) but men are not entirely faultless. All of us have heard and many have participated in the spread of some especially evil rumor which frequently had its source in some innocent remark or circumstance. But by the time it had been passed from mouth to ear a dozen times, it had assumed the proportions of a major breach of ethics which had no relation to the truth. Sometimes a personal reputation is permanently injured, a business deal lost to everyone in the industry or a blot placed upon the record of a firm. And usually the person or organization affected is innocently unaware of the existence of the rumor.

There is one way to meet this situation: When you hear such a story come right back with the statement "I don't believe it." Sometimes you possess facts which will refute the rumor immediately. Frequently it is possible to get such facts and to start a counter movement.

No good is ever accomplished by indulging in the game of gossip. Some day you yourself may be the subject of one of these stories. I think Electra is cured. I told her the gist of a story which came to me from a friendly husband. It was about her clothes. Since then she has joined the movement to spike these little stories the first time she hears them.

THE TRAIN returning from Fresno was heavily loaded, despite the newspaper stories of the suffering of the railroads from loss of traffic. There was an annoying disturbance in my car. Two seats back was an individual who laughed continuously as he read his newspaper. At Modesto two attractive damsels boarded the train. As they walked through the car, the raucous individual casually slipped his feet into the aisle. One hand slid into a coat pocket and, presto, things began to happen. A red light on the instep of his left foot blinked on, a white light on his right did the same. With his other hand he reached into a vest pocket and removed two fountain pen flash lights and began turning them on and off. Other than hesitating momentarily the girls were not impressed. With a sigh, he replaced the flash lights, put his feet back under the seat in front of him and returned to his paper.

Shortly the news butcher came into the car with an armful of papers. The electrically lighted genius stopped him and asked what papers he had.

"Los Angeles, Fresno and San Francisco," was the reply.

"Give me a Fresno paper; they have the highest tension down there," he said.

For the balance of the journey, he read and laughed, and I wondered and wondered. Perhaps he had been to the PCEA conclave at Fresno but I did not recollect seeing him. He got off the train at Martinez. The last I saw of him he was headed up one of the dark streets with the red and white lights flashing on his shoes.

"That's nothing," Electra said when I told her the story. "I've seen you come home from a convention lit up and talking to yourself."

WE HAVE always prided ourself on the progressiveness of the electrical industry. Yet every once in awhile something comes along to upset our equilibrium. Here is a letter received by the sales department of one of our neighboring power companies:

"..... ..... Power Co.,

"Dear Sirs:

"Would you kindly advise as to what steps you take to advertise the sale of electrical energy. For instance do you advertise in newspapers, over the radio, etc.; and do you encourage the sale of appliances by display on your own floor or do you actually sell appliances?

"Any information along these lines will be much appreciated.

"Yours truly,

.....

"City Commissioners"

The letter came from a municipally-owned utility, long established in its community. It is adjacent to a privately-owned system noted for its salesmanship. At first we wondered where the operators of this municipal system had been all their lives. On second thought we called in our subscription representative and gave him hell for not having sold them a subscription to our magazine a long time ago.

"TRADE last," said Electra, a light in her eye. "I think of many nice compliments for you, my dear," I retorted, "but it is inconceivable that anyone would have a good word to say for a minion of the electrical industry like me."

"I am glad you did not take it as a personal compliment," she said. "But I did hear today that your electric appliance industry was way ahead of the parade with its ensemble selling of entire kitchens and laundry rooms. A nice lady speaking to a lot of furniture people scolded them for not being as progressive as you electric folks and selling entire living room, dining room, bed room and play room ensembles including drapes, floor coverings, and brick-a-back. Don't you feel set up?"

"Indeed, yes. We've always given the plumbers the orchid because they beat us to the ensemble idea with the bathroom and are now well on their way to a second bathroom."

"By the way," mused Electra. "I saw a darling summer ensemble today and I was just thinking—"

"Just a minute It's hardly spring yet. Hm, yet I wonder if the plumbers were really first with ensembles?"

Putting Bonneville to Work

Why the government's low-cost Columbia River energy should benefit the Northwest

By FRANKLIN T. GRIFFITH
President, Portland General Electric Co.

IT HAS BEEN known for many years that the Columbia River is a vast source of potential power. Many of the prospective power sites on that stream have long been known to hydroelectric engineers. The practicability from an engineering and economic standpoint of building the Bonneville plant has been the subject of many studies. Approximately 15 years ago an exhaustive study of the Bonneville site was made by engineers of my company to determine the probable cost of development and whether the development could be made in such steps as would permit private financing.

We knew that if a license were granted for the development it would, undoubtedly, require provision for navigation, at least for river steamboats; and we knew that no portion of the dam, power house or locks would be paid for by the United States or by anybody other than the company making the development. We knew that the most efficient ultimate development of the Bonneville site would involve the installation of generating units of approximately the size and number now considered as the ultimate development, but we hoped to devise a plan whereby the cost of the plant could be spread over the years during which use for the output could be developed. We abandoned the project not because it isn't a good one from a power standpoint and not because of the excessively high cost per kilowatt of capacity, even though the entire cost were charged to power, but because so great a portion of the total investment would necessarily be made before even one unit of the ultimate development could be installed.

Navigation Cuts Costs

Therefore, we were greatly interested when President Roosevelt determined to build the Bonneville plant primarily as a navigation project. The Federal government has long maintained its authority and, indeed, its obligation, to improve the navigability of the rivers of the nation and the national Congress would have full power to spend on the improvement of navigation the entire cost of building the Bonneville dam and the sea-going locks. This fact made it possible to slice many millions of dollars from the cost of the power development had it been made by a private company.

Just recently the Federal Power Commission found that the investment in the Bonneville plant with two of its ultimate ten units installed amounted to $53,188,800 but declared that only $11,682,400 of the total present investment would be allocated as a rate base for the initial installation of 86,400 kw. The remaining $42,000,000 of the existing investment would be carried by the United States as a navigation improvement, subject to partial transfers therefrom to power investment as and when additional generators are installed. It is estimated that when the entire installation of 504,000 kw. of capacity has been made the government's total investment will be $74,000,000 of which only $42,000,000 will be allocated to power.

Private Capital vs. Government

The cost of producing power at Bonneville will be much lower than would be the case had the development been made by private capital but this advantage in cost reduction results solely from the fact that a private developer would necessarily have to furnish the entire cost of the development; that a return would necessarily have to be figured on the entire $74,000,000 without any credit of return on the portion which the government says should be allocated to navigation. Interest would necessarily be paid at the rates available to private capital rather than the unusually low rates available to the Federal government. The entire investment, if made by private capital, would immediately be entered on the tax rolls and begin contributing its share to the general tax obligation.

The importance of these advantages may be appreciated when it is understood that the operating cost of a hydroelectric plant is a minor matter; it requires but a few men and but little in the way of materials. The two great elements of cost in hydroelectric generation are represented by interest on the investment and taxes. The minimizing of interest and the entire elimination of taxes are being used by the public ownership proponents as a basis for the substitution of public for private ownership in transmission and distribution. Freedom from taxation cannot be considered an advantage when it is realized that the taxes not paid by the utility property must be shared by all other taxpayers.

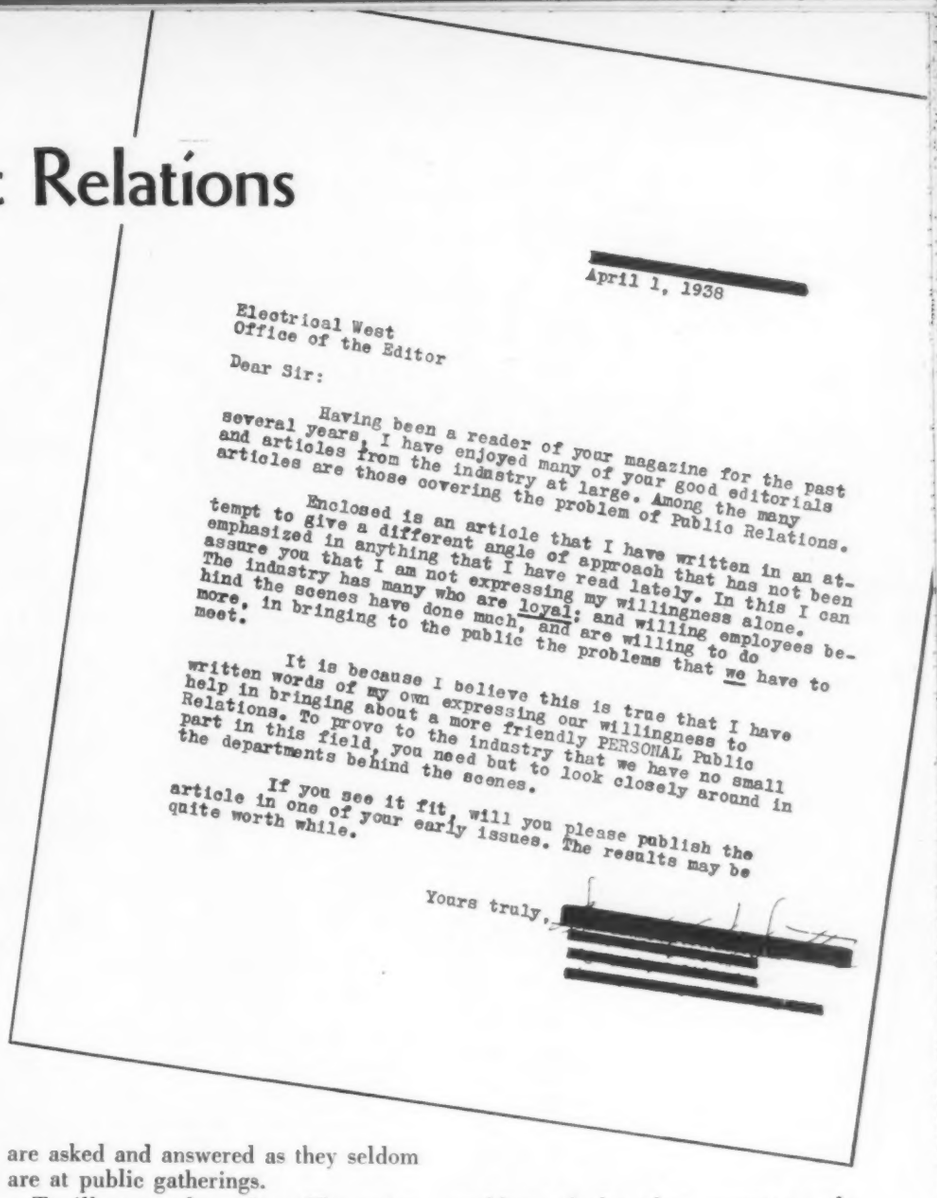
During the building of Bonneville the electric utilities in Oregon have been fully cooperative. They wish the Federal development to be successful and that the plan of Federal development of the latent resources of the Columbia will be continued as rapidly as possible. For these reasons I have given, it is impractical for private capital to undertake the development on the scale forecasted by the Army Engineers. The enormous initial investment in each development upon which no return could be earned for years after the initial installation of units makes the development of the Columbia unsound from the standpoint of private capital, at least until such time as the tributary area has developed in population and resources to such an extent as to be able quickly to absorb the output of all units of each of these great developments.

An Advantage to All

The interests of the Federal government in the development of the Columbia navigation possibilities should be preserved and encouraged so that the enormous Federal contribution to the cost of producing power may be used to the incidental but very great advantage of the people of the Northwest in maintaining for many years to come a great source of potential low-cost electric energy. My selfishness in urging the continuation of this policy is not single nor am I entirely altruistic. I believe it entirely practicable that the advantages of low-cost Columbia River energy produced in this manner, under the circumstances and with the legal advantages I have outlined, can and will inure to the benefit of all the people of the Northwest and to the several agencies permitted to distribute such energy. I can foresee accumulative and steadily increasing advantages to our consumers and to our investors as the successive steps in the great development are made over the years ahead. And I see, I think quite clearly, how all of these resultant advantages can be secured without destroying a single dollar of existing investment, without depriving the public agencies of the tax aid they now receive from the utilities and without losing to the ultimate consumers one whit of the saving in the utilization of Columbia River energy.

Personal Public Relations

In* Electrical West's *mail the other day was this unsolicited letter and article. Reading them, you'll agree that here is a noteworthy approach to a tough problem



April 1, 1938

Electrical West
Office of the Editor

Dear Sir:

Having been a reader of your magazine for the past several years, I have enjoyed many of your good editorials and articles from the industry at large. Among the many articles are those covering the problem of Public Relations.

Enclosed is an article that I have written in an attempt to give a different angle of approach that has not been emphasized in anything that I have read lately. In this I can assure you that I am not expressing my willingness alone. The industry has many who are loyal; and willing employees behind the scenes have done much, and are willing to do more, in bringing to the public the problems that we have to meet.

It is because I believe this is true that I have written words of my own expressing our willingness to help in bringing about a more friendly PERSONAL Public Relations. To prove to the industry that we have no small part in this field, you need but to look closely around in the departments behind the scenes.

If you see it fit, will you please publish the article in one of your early issues. The results may be quite worth while.

Yours truly,

[redacted]

MUCH has been written and more has been said on the subject of public relations. It has been approached from many angles. But most of the discussion has been limited to the public relations departments and the commercial field.

Actually this subject should become an open forum for all divisions of the electrical industry. In the past, however, this viewpoint has been given too little thought; and the whole matter has been handled by special departments created for just that purpose. As a result, much of potential value has been left covered in the various other departments behind the scenes.

It is true that some information eventually does filter down to these other departments, and they are expected to pass it along to the public. But this is not sufficient. There is no follow-up to create in these subterranean forces at least some degree of enthusiasm to be passed on to the public. Consequently a realistic program of education affecting every person in the industry and covering all the problems and ideals of the industry should be launched.

The teachings of safety first and first aid are not limited to the transmission department merely because those workers experience the most apparent hazards. Why, then, should we stop at the commercial department in our efforts to promulgate an understanding public relations spirit?

Obviously we shouldn't. There is one field—the most important field—which is not covered by specialized public relations and yet is the problem of every single employee.

At some time or other, either while on or off the job, the testman, maintenance man, lineman, operator, etc., come in close contact with the public. This is not public relations in the ordinary sense of the word. This is PERSONAL public relations. This is a discussion between men on an equal footing. This is the time when questions are asked and answered as they seldom are at public gatherings.

To illustrate the point: The writer is employed in one of the larger Western hydro plants, situated on the highway leading to an increasingly popular summer resort. (This resort, by the way, is located on the edge of a lake formed for the purpose of generating hydroelectric power.) During the past year, upwards of 700 visitors—only a small percentage of those who drove by, because there is no open invitation to the public—inspected the plant. More will pass through this year, and next year, and the year after.

These visitors hail from all parts of the world, though the majority comes from within the limits of the territory served by the Western utilities. These visitors are from all walks of life, and they are interested in the workings of the plant or otherwise they would not have stopped. These visitors, every one of them who is over 21 years of age, have a vote in making the laws which control the electrical industry. Not only that, but they also may help influence other votes that the industry does not contact.

These visitors, then, are the personal problem of the plant operator, who shows them through, and his assistants. They form a problem of personal public relations.

With the trend slightly more favorable to the industry, we should overlook no possibilities to encourage a trust in us and a real exchange of public service and understanding. We of the industry not in close touch with administrative ideals, problems and policies should be given the same facts and figures on which to base our logic in meeting the public as are given to the public relations and commercial departments.

That the industry needs good-will is a conclusion more and more brought to our rather painful attention in recent times. That it takes long and patient work to overcome even the slightest amount of ill-will is also an obvious conclusion. But I repeat: It is not enough that the public relations department be solely relegated to handle the work. All industry employees should lend a hand.

And we will. We are willing to do our part. Try us.

Kitchens & Homes

Spokane residents get excited about electrical living

Kitchen-minded are citizens of Spokane as a result of Washington Water Power Co.'s and Spokane Better Housing Committee's concentration on the subject of all-electric kitchens. Activity which last year accounted for completion of plans for more than 459 kitchens is being continued this year on the same, though more closely supervised, scale.

Tying in with the National Kitchen Modernizing Bureau's activity, the utility in 1937 drew nearly 300 entries from 3,000 kits distributed in the kitchen planning contest. Not only this, but some equipment was sold and dealers and the company built up a valuable prospect list.

This list showed that 64.4 per cent of the prospects owned their own homes; 35.6 per cent rented. A refrigerator will be the next major appliance purchased by 40 per cent; electric range, by 20 per cent; mixer, by 13 per cent; water heater, by 11.4 per cent; dishwasher, by 7.8 per cent; roaster, by 7.8 per cent.

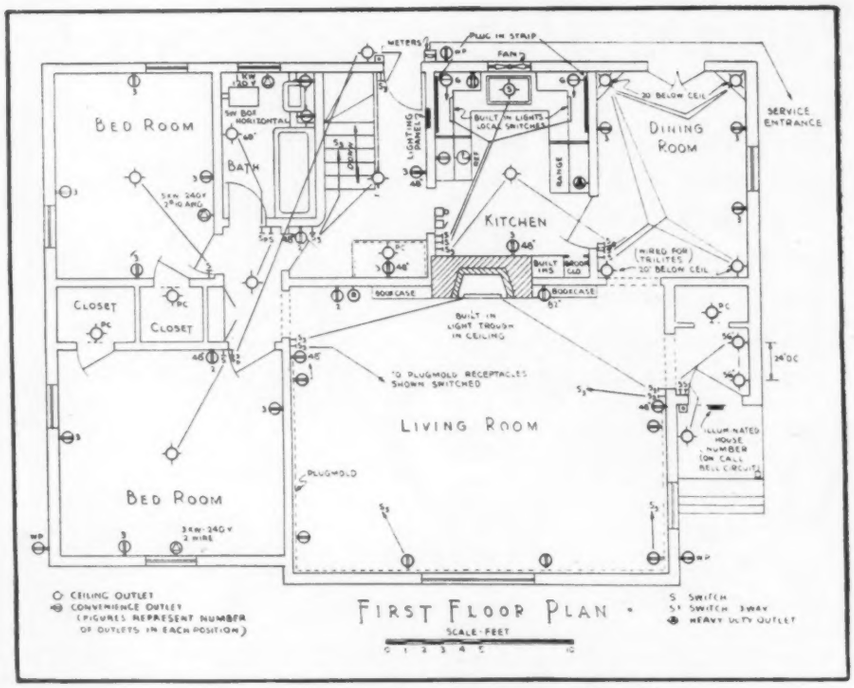
All refrigerator prospects received by the power company were turned over to the Better Housing Committee for distribution among the dealers.

Meetings, at which the kitchen modernizing program was explained and illustrated, were held with both Spokane and suburban dealers. The story of the step-saving kitchen was told at several women's club sessions and at cooking schools. Ten new model kitchens were built in local stores and ten in the main suburban offices of the company.

An indication of how well the story was put across is a survey made toward the end of the year of 218 kitchens planned in Spokane. Of the 185 replies, 85 reported that they had completed the kitchen; 82 that they were in the process of completion; 22 that they did not intend to do any work. Eighty-four had installed new lighting and/or wiring; 24, ventilating fans; 43, ranges; 46, refrigerators. A high percentage had made other improvements such as painting, plastering and plumbing.

Budget for the 1938 effort is set at the same figure, $8,000, as last year. Last year, however, the electrical industry carried only 29 per cent of the burden, this year it will carry over 33 per cent. The full budget was scheduled to be raised by April 1.

Already the power company and housing committee have sponsored a showing of a Reddy Kilowatt home.



The electric home of Mr. and Mrs. H. A. Halstead

During the 13-day opening, 5,406 visitors were shown through the home and many hundreds drove by but did not wait in line to get into the house.

Built by H. A. Halstead, manager of the Better Housing Committee, the house is the last word in electrical living (see floor plan). The U-shaped kitchen boasts electric range, refrigerator, fan, clock, garbage-disposal and a breakfast cabinet with toaster, coffee maker and grill. Each room is indirectly lighted and served by a good number (12 in the living room) of convenience outlets. Air conditioning and heating equipment, consisting of an automatic stoker and specially designed dry filter, eliminates all pollens causing hayfever and bronchial asthma.

Other details of the drive to modernize kitchens and electrify homes have not as yet been announced. With the revival of Title I of the FHA, however, both company and committee are looking for even more business than in 1937.

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Service League

What is being done to build business in British Columbia

Selling refrigerators in Vancouver, B. C., is about the same kind of job as selling furnaces in San Francisco. Both cities (Vancouver with justification) consider their climate better than that of any other section of their respective countries, so they are prone to feel they do not need appliances necessary elsewhere. To break down this resistance, therefore, Vancouver appliance dealers have to do some fine figuring.

Late in March the refrigeration committee of the Home Appliance Council of the Electrical Service League of British Columbia lent the dealers a hand. Staged for the benefit of all—and especially the public—was Refrigeration Week. Under the league's leadership, dealers decorated their stores and took in the daily papers large advertising space in which they told one story—not how electric refrigeration kept food cold but how it saved the housewife money.

Such an activity on the part of the Electrical Service League is nothing new. For years now the league has been coordinating the British Columbia electrical industry, particularly the contracting end of the industry. More than almost any other organization the league has brought prosperity to the B. C. electrical contractors, etc.

This is pretty well indicated in the seventeenth annual report just completed by Secretary-Manager R. Hall.

In industrial promotion work the league, with contractor cooperation, introduced a new method of range wiring. This made it possible to wire ranges in old residences for $42.50 instead of for $60.

In New Westminster the league formed an electrical contractors' association, and in North Vancouver it laid the groundwork for a similar association. Thus it augmented the efforts of the Vancouver Electrical Assn. (ELECTRICAL WEST, Oct. 1937, p. 32)

In public education the league, in

SALES PARADE

cooperation with the Central Station, presented some 332 programs before 20,362 persons and conducted fourteen cooking classes attended by 2,400 persons.

In the residential field, Red Seal wiring occupied the stage. Two hundred and twenty-nine certificates, a 25 per cent increase over 1936, were issued; 143 homes installed Red Seal wiring complete except for range wiring; 45 sets of plans were prepared for owners and contractors; 1,156 outlets were added to electrical installations in new construction jobs. Model homes also came in for their share of attention by the league.

In the commercial, industrial and residential lighting fields, B. C. Electric Railway's cooperation with the league was responsible for the sale of approximately $145,000 of equipment, wiring and labor. The promotional and advisory service of the league built up even wider public acceptance of better lighting and greater cooperation among contractors.

An outdoor lighting contest, augmented by a similar contest for members of the industry, was conducted during the Christmas season by the league.

Probably of most importance, because it gave to the league program a retail objective which it had always lacked, was, however, the formation of the Home Appliance Council.

This council, chairmanned by G. N. Gardner of Canadian Westinghouse, has four committees covering ranges (chairman, Gordon Meekison, Clarkson's, Ltd.), radio (W. C. Clark, Western Agencies, Ltd.), home laundry (Jack Drain, Woodward's, Ltd.), and refrigeration (J. E. McCormack, McLellan, McFreely & Prior, Ltd.) During 1937 these committeees sponsored a home laundry week, refrigeration week, range week and establishment of a policy on radio trade-ins, use of the blue book, etc. Also sponsored, but by the council as a whole, was a sales training program which extended over into the first two months of this year.

Based on the success of a previous G. E. course, this training program was the cooperative effort of the league, Canadian Westinghouse, Canadian General Electric and Northern Electric Co., each of which put up $75, and B. C. Electric, which donated its auditorium. Registration fee for salesmen was $1. Total number of salesmen registered was 300 —40 per cent B. C. Electric company salesmen, 60 per cent outside salesmen.

The twelve meetings which made up the course ran from Oct. 25 to Dec. 2 and from Jan 17, 1938, to Feb. 2. Sessions were held twice weekly, covered the following subjects and were conducted by the following organizations or men:

Kitchen planning, General Electric, home laundry, Westinghouse and Northern Electric; business practice, credit manager of D. Spencer and comptroller of Hudsons Bay Co.; lighting school, General Electric; small appliances, the late David Fernie of B. C. Electric; advertising and display, B. C. Electric; 1938 dealer cooperative plan; electric cooking, General Electric; gas cooking, Wedgewood; refrigeration, Westinghouse; wiring and service aids, league and Vancouver Electrical Assn., and hot water, B. C. Electric. A banquet wound up the program.

Neither too theoretical nor too simple was the lesson learned at each session. Questions covered every phase of the subject and did so with a practicability which left no doubts as to what was meant. "What is the first requirement of a salesman in selling a washer or ironer?" asked the instructor in the home laundry meeting. "What is the second requirement?" "What is the best method to use in order to interest a prospect?" "What is the most necessary qualification to stress to your prospect in order that he will pay a higher price than he intended?" Etc.

Real value of such training will not be felt until this year, however, when the council undertakes new courses to teach dealers profitable business technique; to teach dealer salesmen the fundamentals of selling; to teach B. C. Electric salesmen advanced specialty selling.

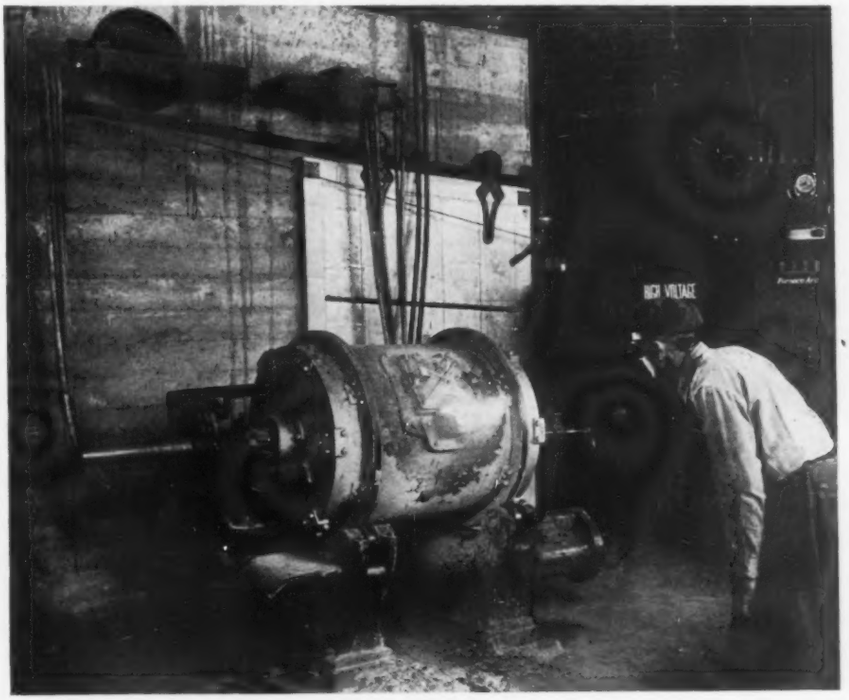
Industrial Sales

How a brass works benefits from an electric furnace

Until recently National Brass Works, Inc., one of the leading jobbing foundries in the Los Angeles area, did its brass melting in oil-fired furnaces. While willing to concede the superior melting speed, improved product and better working conditions afforded by an electric furnace, the management felt that several fuel-fired furnaces could handle the variety of brasses to be melted better than one electric furnace. They were also afraid that the cost of electric melting would be excessive.

Southern California Edison sales engineers felt differently. After a careful study of the prospect's operating conditions, they became convinced that an electric furnace not only could meet all melting requirements but also could put melted brass into the ladle at a lower cost per pound than was being obtained with the oil furnaces. Negotiations began with the brass works, and after some time a deal was arranged whereby a 350-lb. Detroit rocking electric furnace was installed in the customer's plant.

Shortly after the furnace was put into operation tests were conducted to determine melting costs. These tests conclusively proved that the overall cost of electric melting was actually less than the cost using oil. Results: Except in emergencies when extra capacity is



Melting brass in 350-lb. rocking electric furnace

needed, the oil furnaces have been supplanted by the electric furnace which is now in daily operation. The addition of this electric unit has opened up a wider field for the melting of the different alloys in which the concern specializes.

Connected load of the furnace is 100 kw., single phase. Maximum charge is over 400 lb. of brass which can be melted in about 25 min. Over 3,000 lb. of brass can be melted during a regular eight-hour day.

From every standpoint the installation has proved satisfactory. The consumer benefits from a more modern, economical and cleaner melting room; the electrical contractor from a substantial wiring job, and the utility from a sizable sale of power. Any brass jobbing foundry pouring in excess of 30 tons per month should be considered a live prospect for at least one electric furnace.*

*Any PCEA member desiring a reprint of one of this industrial power series may be put on the mailing list by filing his request with the chief commercial executive of his company.

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Future Campaigns

List of utility-dealer drives for May, June & July

Scheduled for May, June and July by utilities and electrical leagues are the following dealer campaigns and special events:

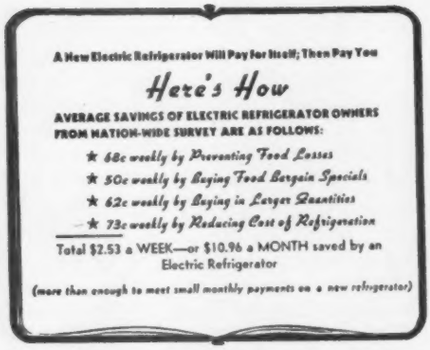
B. C. Electric Railway Co.—June campaigns on table appliances—June bride gifts—,ranges and refrigerators. An employee flower show will be held at the Granville St. salesroom in June. July campaign on summer cooking appliances.

City of Seattle—Campaign for June, automatic tank water heating; for July, water heating and refrigeration. During June the department will have a modern kitchen display in cooperation with the FHA and will hold a customer prize contest for the best 300-word letters on kitchen modernization. In July the department will have a booth display of units in the modern electrical kitchen. As a special feature of these events there will be an employee campaign for new prospects.

Coast Counties Gas & Electric Co.—Campaign for June and July on roasters. Demonstrations will be held during both months.

Home Gas & Electric Co., Greeley, Colo.—Campaigns for June, water heaters and ranges; for July, ranges. This month ranges and cleaners are being pushed.

La Veta (Colo.) Light, Heat & Power Co.—For June and July, refrigerator campaign. This month, washing machine campaign.


A New Electric Refrigerator Will Pay for Itself; Then Pay You
Here's How
AVERAGE SAVINGS OF ELECTRIC REFRIGERATOR OWNERS FROM NATION-WIDE SURVEY ARE AS FOLLOWS:
★ 68c weekly by Preventing Food Losses
★ 50c weekly by Buying Food Bargain Specials
★ 62c weekly by Buying in Larger Quantities
★ 73c weekly by Reducing Cost of Refrigeration
Total $2.53 a WEEK—or $10.96 a MONTH saved by an Electric Refrigerator
(more than enough to meet small monthly payments on a new refrigerator)

Campaign keynote of the refrigerator campaign, April 21-May 21, of the Electric Appliance Society of Northern California

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Los Angles Bureau of Power & Light—For June, water heating campaign.

Mesilla Valley Electric Co., Las Cruces, N. M.—For June, range, water heater and evaporation cooler campaigns. For July, range and water heater campaigns. This month, refrigerator and air conditioning campaigns.

Montana Power Co.—For June, range and refrigerator campaigns.

Mountain States Power Co., Casper, Wyo.—For June, refrigeration and adequate wiring campaigns. This month, refrigeration campaign, electrical merchandising show.

Pacific Gas & Electric Co. and Electric Appliance Society—For June and July, range campaign. This month the refrigeration campaign sloganed "It Pays for Itself and Then Pays You" is ended. Drive, aimed at the families with a less than $2,000 income, shows how a refrigerator can be purchased out of savings it will make in household expenses. (See cut.)

Pacific Power & Light Co.—For June, all-electric kitchen campaign. For July, refrigeration campaign.

Portland General Electric Co.—For June, range campaign.

Public Service Co. of Colorado—For June and July, IES lamp and refrigerator campaigns. Special sales contests will be held during both months. The Brighton division will drive on refrigerators and ranges in June; refrigerators, ranges and small appliances in July.

San Diego Bureau of Radio & Electrical Appliances—Second annual spring fair will be held May 18-22 at Balboa Park. Backed by newspaper and radio advertising, the show will feature virtually all appliances. Display space for small appliances and radios, largely overlooked last year, will be increased. Adequate wiring will be specially pushed. Full possibilities of FHA financing of built-in heating equipment and other eligible equipment for new and occupied homes will be spotlighted. Says J. Clark Chamberlain, manager: "Recognizing what must be done (to develop business at a time when business is bad), we are planning to 'shoot the works'."

Sheridan County (Wyo.) Electric Co.—For June, rotary and flat plate ironers campaign. For July, small appliance campaign.

Southern Colorado Power Co.—For June and July, range, water heater and refrigerator campaigns.

Southwestern Public Service Co., Carlsbad, N. M.—For June, three-light lamp campaign. This month small and major appliances are being shown; irons being stressed.

Utah Power & Light Co.—June campaigns on water heaters, table cookery and commercial cooking; July campaigns on table cookery and commercial cooking. To back up the commercial cooking drive, a commercial cooking truck, demonstrating full line of equipment, will travel to all divisions and visit all customers. During June and July the company will also hold commercial lighting exhibits.

Western Colorado Power Co.—For June, water heater campaign.

Puget Sound Power & Light Co.—For June and July, range and water heater campaigns.

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Cavalcade Drive

Latest news about the drive to beautify San Francisco

Seven electrical contracting firms in San Francisco have identified themselves with the initial promotion of "The Cavalcades are Coming in 1939" store front modernization program initiated by the Pacific Gas and Electric Co. Thus reported R. T. Stephens in charge of the activity for P.G. and E., San Francisco Division, at the second monthly meeting called among all trades interested in such modernization work.

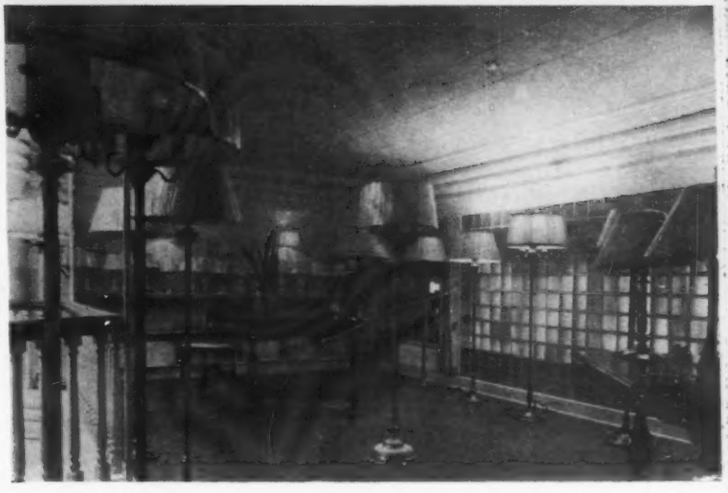
At the same time Mr. Stephens summarized the results thus far. In the February drug store circularization 350 broadsides had been sent out and followed up sytematically by the salesmen of the company. Out of this 43 active prospects have been gained. From the 43 prospects 17 expressed themselves definitely anxious but not sure just what to do, 8 were prospects and ready to go, 11 needed lighting equipment, 4 needed general improvements, one needed repainting, 2 needed signs, and one needed flood lighting. Circularization in March was to Food stores, 1540 broadsides being sent out. April circulars went to beauty parlors, and May circulars are going to 2,650 restaurants and cocktail lounges.

Prospect slips are of two kinds—one developed by utility contractors, another by contractors wishing P.G.& E. helps.

Way back in 1907 Wesley Evans and his wife started Salinas Electric Co. with a table and an old square piano for a counter; sold the first electric iron in town. Since then they have grown out of one store after another. Son Wesley, Jr., came back from Stanford and joined the firm. Now a dream Mrs. Evans has long had has come true in their new store, opened March 1. Many excellent ideas are embodied in it, as illustrated here. Above: left, small appliances on glass shelves, lighted from flush opal glass panels over them. The fixture display, all fixtures "alive" on alternate circuits so as to separate them to show a customer; glassware is on the counter

The Evans' of Salinas

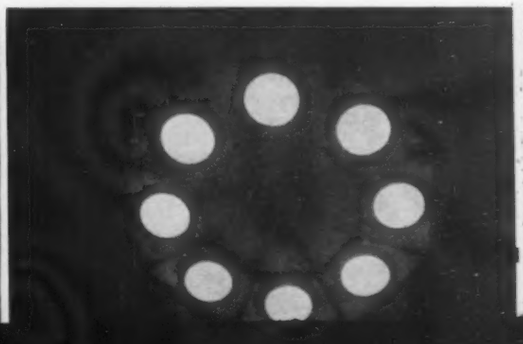
Make a Dream Come True



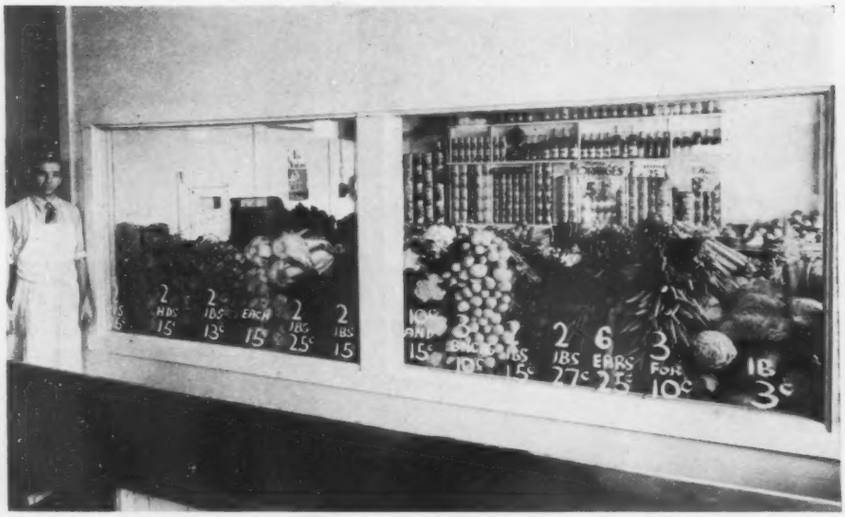
Below: Modern, silhouetted against luminous glass blocks is the pioneer name "Evans" in copper, surmounted by a neon sign that is integral to the building. Well lighted windows with a floor level slightly higher than the interior combine ease in moving merchandise yet raise it for a better display effect

Below: One of the luminous niches on which to display an appliance. Near the window, this one has the photo-electric "eye" which sounds chimes when customers enter. At right, below, is one of three special skylights, designed by W. S. Evans, Jr., containing 8 200-watt Holophane units and a color circuit to illumine the surrounding glass panels in a contrasting pattern. Level of intensity over the entire store is over 25 ft. candles. A "Bargain Basement", where shopworn, outdated or second hand appliances and lamps may be offered and kept off the main floor is lighted by a variety of commercial fixtures and is thus a display of them

Above: Top, the lamp counter, flanked by two lighted niches, and stairs—left to the floor lamp, right the fixture departments. Center: glassed-in sound-proof radio room is a show case in itself. Stairs to the "Bargain Basement" are at left, the shop and office at right, fixture room on balcony above. Lower: A standard 10 ft. ceiling makes the lamp display balcony over the front windows ideal for showing floor and table lamps. Large windows at each side of the glass brick permit a view of lamps from the street—another display idea



Refrigeration Room for Perishable Foods



B. Motte, Coalinga, Calif., grocer, poses beside his new refrigerator for perishable goods. The refrigerator is a large room which the customer enters when making purchases. Crisp and tender, yet plainly visible, are the vegetables as a result of the cool temperatures. Other perishables are displayed on convenient shelves

Stunt

A hanging refrigerator evokes curiosity, builds sales

Curiosity will not only kill the cat but also bring you extra sales. At least that is what the Home Appliance Co., San Diego, discovered when they tied a ½-in. rope to the door handle of a 390-lb. Westinghouse refrigerator, opened the door and suspended the whole rig from the electric sign in front of the store.

"Shoppers' curiosity about this demonstration of refrigerator strength gives us a perfect conversational opening into the sales story," Frank Guthrie, Home Appliance salesman, reports.

Says E. W. Pohl, store manager: "The first few days of the demonstration resulted in ten sales. We have to take the suspended box down to close the store—put it up every day. This flag-raising exercise draws extra crowds. The stunt has so much advertising value that we're going to keep it up indefinitely."

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Selling Safety

Sierra Pacific's simple display brings desired results

Sierra-Pacific Power Co. was mildly desperate about the increasing breakage of line insulators by bullets. It had a pretty good idea who was causing the damage—disgruntled hunters and happy-go-lucky boys. But it didn't know exactly how to stop the outrage.

Finally, but without much hope, it erected what seemed to be a rather prosaic display in the window of its Reno office. Simply put together, the exhibit consisted only of a number of bullet-broken insulators, with cards telling how many times each had been struck, and two placards describing the dangers of a falling line and the losses to the public of possible interruptions.

Immediately the display scored a success. "For some unknown reason," F. C. Hodge, company sales manager, reported, "people seemed to be fascinated. Almost everyone stopped long enough to read both signs carefully and comment on the insulators. A surprising number even came into the office and commented favorably to our office force."

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Sales Shorts

NEW MEXICO properties of the Federal Light & Traction Company have withdrawn from merchandising of all electrical appliances. Stocks of appliances have been sold to dealers who are expanding their stores in many instances. A broad cooperative policy is to be followed with the Rocky Mountain Electrical League taking up the burden of general promotion. Leagues are being formed in various localities. The May Music Company of Albuquerque has taken on the power company's G. E. line of refrigerators. The Home Appliance Company has taken on its gas appliances and moved to a new location. A "home planning show" was being developed for April in which all dealers in the region were participating.

EL PASO, Texas, has an Evaporative Cooler Dealers' Association of which O. N. Wherrett of the Electric Appliance Service Co. is president. Fifteen dealers belong, including a lumber company. The Association handles cooperative advertising on radio and in newspapers, price stabilizing, and works through the power company on prospects on a rotation system.

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SERIES OF SIXTEEN MAPS picturing potential markets in the United States for all types of consumer merchandise is being made available by the Marketing Research Division, Bureau of Foreign & Domestic Commerce.

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TWO NEW ELECTRIC WATER HEATER sales helps are being made available by Hotpoint. One is the "Water Rater," a pocket-sized estimator which automatically shows the size heater, approximate number of kw.-hr. consumed per month and the total number of gallons used according to the maximum day's needs of a family. The other is the "X-Ray Visualizer," spiral-bound book used in place of demonstrations.

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ONE WAY TO INCREASE business—to such an extent that the stunt will be tried again—has been shown by Northern Sound & Radio Co., Portland appliance store. "Portland's foremost psychic reader, Professor Knight"was the star attraction. To all customers and friends he gave a 10-min. psychic reading free.

●

MAKERS OF IES LAMPS, various utilities, distributors and the Rocky Mountain Electrical League are completing details of a large sales campaign, one feature of which will be an expense-paid trip to the League's Yellowstone Park convention for the one who sells the most IES units between now and Aug. 15.

WHEN A "LIVE" HIGH TENSION WIRE FALLS TO THE GROUND IT MAY WRITHE AND LASH OUT LIKE A TEAMSTERS
For your own safe
BE CAREFUL WHERE YOU SHOOT

Sierra Pacific display (see Col. 1)

ELECTRICAL WEST

Appliance Sales Guide

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How to Sell More Electric Water Heaters

Practical Suggestions for

Salesmen

Your commissions or salary depend on sales, and you depend on your income to get more than mere living—a chance at some of the luxuries and better things of life. The successful salesman of water heaters needs a little more preparation than for the selling of any other appliance, perhaps, but every bit of such preparation pays dividends. Preparation is more than 50 per cent of any sale, anyway, a national survey recently found among the most productive salesmen. The pre-approach is 50 per cent of the secret of a sale; the approach itself about 10 per cent.

For water heater sales the pre-approach consists of getting advance knowledge first of local conditions such as rates, type of water heater for which the power company or utility in your locality has special low rates, water conditions, wiring allowances or arrangements that can be made for wiring, and similar information by which to select the right merchandise and sell it intelligently.

Second, it seems too obvious even to mention it, the salesman needs to prepare himself thoroughly on the product, learn its special and quality features, know it so completely that he can answer any question relative to it.

Third, the salesman who investigates his customer before even making a call will smooth his way and make more friendly contact. He can better fit the advantages of an electric water heater to the specific needs of his prospect, which is the best way to sell. In the table in the middle column on this page important things to find out are listed. While many of the questions may seem to be personal and perhaps impertinent, it depends on how the salesman asks them, how he explains that the information will assist him in determining just the right kind of water heater for the most satisfactory service to the prospect.

The manufacturers of electric water heaters now have convenient charts and tables by which you can convert the information thus obtained into an accurate estimate of the size of tank and capacity of water heater required.

Get from the utility its slogan or its method of popularizing the low cost of electric water heater service. Naturally this is different in each power company territory. But if the utility has some such slogan as "10 cents a day for all the hot water requirements of the average home," use that too.

Things to Find Out

Before starting

1. **Type**—what kind of water heater the utility gives favorable rates to.
2. **Rates**—what the special water heater rates are and how applied.
3. **Water conditions**—whether hard or soft and what this requires.
4. **Wiring**—whether any allowance or special arrangement is offered.
5. **Campaigns**—so that you may tie-in and ride in on the advertising.

While selling

1. **Size of family**, and ages.
2. **Bathing habits**—when and how often.
3. **Laundry**—is it done at home?
4. **Number of hot water** faucets.
5. **Location** of piping and where the heater or heaters will serve with least run of pipe.
6. **Insulated** hot water pipe, or can it be insulated to advantage?
7. **Which advantage** or special water heating service appeals most.

Dealers

Let first things come first, is a mighty good precept in any kind of business. In selling electric water heaters it is particularly important. It means that a dealer will select from among the variety of sales helps offered those that will fit best with his own size and scope of operation, thereby conserving his investment and making every bit of it work harder for him.

In taking on the sale of electric water heaters a dealer who is smart will drain the local utility of all the pertinent information that it has acquired by years of experience in selling this appliance. Not only can he avoid mistakes that the utility already has worked its way through, but he can take advantage of any angle of appeal that the utility has developed. He can select his merchandise with more accuracy if he knows from utility experience that a certain style and size of tank will fit more of the average requirements of a community than other sizes. This means less inventory and better, faster turnover.

Campaigns launched by the utility are valuable market stimulating influences. A wise dealer will learn of these beforehand, prepare himself and his salesmen for them, and steer his course in the wake of such a campaign to reduce his own sales resistances. His own selling and advertising will be more effective in such campaign periods.

It is also worth while trying to make arrangements, perhaps with one or more other local dealers, that between the utility and the dealers the expense of obtaining some of the more costly demonstration equipment may be shared. Movie films and projectors, sound slide film projectors, such as illustrated on the last page of this Guide, may be too costly for you alone, but if a joint use can be worked out, you and others may benefit.

If an opportunity is offered to display your water heater at the power company office or in some joint show or display, jump at the chance. A lot of floor traffic flows past such displays and since selling depends on the power of suggestion, the oftener you can suggest electric water heating to people in your town the more sales you can make.

Both electric kitchens and electric laundries require hot water service. So for every range and refrigerator, or every washer and ironer you sell, drop a hint, better yet, actually try to sell an electric water heater. The sale may not be closed then but leave the suggestion.

. . . When the

Sell Necessity . . .

Just how to sell electric water heaters with profit and satisfaction differs with the times. When times are good the luxury appeal is far more important than any other. But when times are harder, the sales resistances all spring from thoughts of cost. To overcome these resistances and to set aside the prospect's inclination to deny himself luxury as a sort of "penance" during money-tight times the successful salesman will sell the **necessity** of an adequate, dependable hot water supply, and prove its ultimate **economy** by explaining the value of each of the many services an electric water heater can perform. In just such terms the benefits and advantages of an electric water heater are listed in the next column.

The present day desire to economize is usually brought forth against the sale of an electric water heater as one of the following objections:

1. **Heater costs too much.**
2. **Operating cost is high.**
3. **Old heater is good enough.**
4. **Inadequate (old style perhaps).**
5. **No space for it.**
6. **Not now—maybe later.**

Although these objections seem to be different the motive behind each is very apt to be the same fear of spending money in times like these. The salesman's answers to all such obstacles should be phrased in terms of long-time economy, of values that make price seem insignificant, of necessities that can be had only by the use of a water heater, and of economies that can be made in other directions with the aid of hot water. For example,

Economical because . . .

1. **Clean**—Cleanest of all water heating methods. Ends the drudgery of soot, smoke, ashes and fuel storage. Woodwork and draperies stay clean. Less housekeeping is needed. Hot water makes easy any other cleaning task. The water heater itself is always clean and neat. All these save time and money.

2. **Healthful**—Warm water for baths is a necessity for health these days. Hot water is one of the finest beauty aids. Children bathe without grumbling when water is warm. It is easier to keep them clean after hard play. Clothes are washed more quickly in hot water and are better sterilized. Dishes are made sterile by hot water rinses, preventing spread of infections. Hot water is a prime necessity in case of illness, especially at night. An automatic electric water heater provides this emergency service without thought or bother. All of these have every-hour economy value to any home.

3. **Peace of mind**—It is worth a great deal to be able to leave the house feeling sure that the electric watchmen (thermostats) keep the tank full of water of just the right temperature. Nothing to turn on or off but the faucet. No lighting, watching, remembering, worry, hurry back home. Babies can play around the heater. Or it can be installed in a closet or attic and never given another thought. This peace of mind is priceless.

4. **Long life**—The electric way of heating water under perfect control makes for longer life of the tank and heating elements. Piping and drains are kept clean more easily with hot water to cut greases. No flue or flue repair is needed. Home value is enhanced; insurance risk is reduced. Hot water helps to maintain other home equipment and lengthen life of paint, draperies, furnishings.

5. **Efficient** use of energy. Every bit of electricity is converted into heat; no waste. Water heated to an economical temperature; no overheating waste. Heat is kept in the tank by insulation. Water usable immediately; no waste in waiting for it to run or heat.

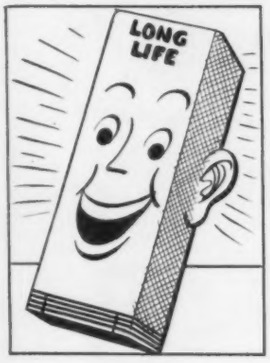
ROCKY MOUNTAIN ELECTRICAL LEAGUE • PORTLAND GENERAL ELECTRIC CO.
CALIFORNIA OREGON POWER CO. • WASHINGTON WATER POWER CO.

Prospect Says: "NO"

NO. 4B

WATER HEATERS

Meet the objections or excuses this way . . .



1. **"Heater costs too much?**—I can appreciate that the cost might seem high at first glance. But have you thought of the complete economy of an adequate and convenient hot water supply in terms of your family's health, in cleanliness, in peace of mind, long life of the equipment, and the full efficiency you derive from electricity as against more wasteful methods? Let me explain how each one of these can result in real economy for you." (Proceed to explain the time—energy—and money-saving value of each of these as suggested in the list on the opposite page. Then end with—) "Now the money value of these advantages may be hard to estimate, but they far outweigh the first cost, don't you think? Why not take advantage of our budget plan to bring these benefits to your home right away?"

2. **"Operating cost high?**—I am glad you brought that up, for it gives me an opportunity to clear up a very important point that you might not be satisfied with if it were not answered for you. By operating cost I presume you think of the electricity charge only, because that is the most obvious cost. Looked at in a larger sense, as the cost of complete and care-free hot water service, night and day, in sickness and for health, electric water heating helps you to cut so many other costs that the electric bill turns out to be a bargain. Take the item of life of the equipment, for example—" (Go into this factor of long-time cost, then take up the cost of keeping the house clean, the cost of health, the value of safety and peace of mind, and the efficiency of the electric way of providing hot water).

3. **"Your old heater is good enough? . . .** That sentiment is easy for me to understand too. We want to make all of our belongings go farther these days, don't we? That's one thing I like about these electric water heaters. Once you buy one of these you can absolutely put the matter out of your mind from then on. Not only can you install it in some closet, attic, or corner of the kitchen where it is out of the way, but you can absolutely rely upon the electricity to take care of itself. It will do all the thinking needed—keep just so hot, no hotter, turn itself on and off, be ready for your every hot water need at the turn of the faucet." (Go on to sell the other features and economies from this start).

4. **"Inadequate?**—Oh, you were one of the pioneers in electric water heating then, weren't you? Unfortunately the old time water heaters were not what they are today. But we must give them credit. They were so much better than the primitive conditions before they came that they were very useful in their day. And they helped bring electric service into wider use and make rates as low as they are today. Naturally our standards have changed, in water heaters as well as automobiles and homes. We expect more of water heaters today and I am glad to tell you that we are not disappointed in these new automatic models." (So far, so good. The resistance caused by the old style heaters has been eased off. Now it is time to go into the advantages of the new models, stressing first the **services** hot water will bring to the home, then proving them with details of construction, and ending by asking for the order).

5. **"Space?**—Well, here is one electric service that can make itself more inconspicuous than any other, and yet be on the job more of the time than any of them. Because it does not need flues or vents it can go in places that you could not use another type of heater. It can go in the basement right under the kitchen, or bathroom, or in the attic above, or be tucked away in a closet, put on the back porch—I've seen them put outdoors in extreme cases. You never need to touch it to light it or take out ashes, so it really does not require floor space if you are cramped. Considering this unique value and the fact that it . . ." (tell the other advantages here to build the full appreciation for hot water service and then ask for the order).

6. **Not now — maybe later**—"Certainly, I will be glad to come back later. But before going, if you have just a minute, let me refresh your mind on several advantages that I should think would mean a great deal to you. You impress me as a person of good judgment and with an eye to the future. I don't need to remind you how useful hot water, at the turn of the tap, without fuss or bother, would be to you and your family. You can appreciate how much easier it will make all your household cleaning . . ." (go right on reminding her of all the advantages of an automatic trouble- and thought-free supply of hot water. Even if she does not buy now, the reminders you leave will keep on working for you until your next call. Never leave a call without planting the seed for an eventual sale. Sometimes it has to sprout of itself after you have gone).

THE MONTANA POWER CO. • IDAHO POWER CO. • UTAH POWER & LIGHT CO.
PUGET SOUND POWER & LIGHT CO. • PACIFIC POWER & LIGHT CO.

Do Something Simple

but do it well—

Water heaters at first thought may seem to be difficult things to demonstrate and expensive to advertise. True the dealer must use his head, but by selection of one or two things, and doing them well, he can make a success of electric water heater sales whereas if he spreads himself too thin over too many activities and advertising ideas, each one good in itself, he can spend more than he makes. For the average electrical dealer the three things suggested on this page will bring success if done often, consistently, and persistently.

●

ENVELOPE STUFFERS, obtained from the manufacturer, are available in a wide variety. Some tell the complete electric water heating story, others go more thoroughly into one or two advantages. There are special kinds for coal and wood furnace coil or monkey stove localities, other for where the competition is gas or oil. Use them in every letter and bill you send out. Best of all, use them to back up a letter such as that below.

Slide-Films either with or without sound, provide the most effective tool with which to demonstrate water heaters. Sound slide films do the sales talk for you, but you can be your own sound by learning your sales story thoroughly and telling it along with your pictures.

YOUR STORE
TOWN
DATE

Mr. A. B. Jones,
R.F.D. 1, Box 43,
Yourtown, State

Dear Al:

Got to thinking that I only gave you folks half a loaf when I sold you that electric range last ..... Now I'd like to see you get your full money's worth from it by providing you with its natural team mate, an automatic electric water heater. I would appreciate a chance to show what it would mean to you now that you have your range. For instance:

That electric range I sold you was clean, wasn't it, just as I promised? Well, a water heater just makes everything else clean, too. It will **end the drudgery of soot, smoke, ashes, and fuel storage** for you. **Your woodwork and drapes will stay clean. Less housekeeping will be needed** and I am sure Mrs. Jones will appreciate that, and you will by providing it for her.

Hot water makes it easy to do whatever cleaning there is to be done, from baths to dishwashing, from the week's wash to spring housecleaning. **All this saves you time and money** in the long run.

Suppose I drop out some evening and talk it over with you. There are a lot of other good reasons for you to consider.

Yours cordially,

(Signed) .....

Letters---

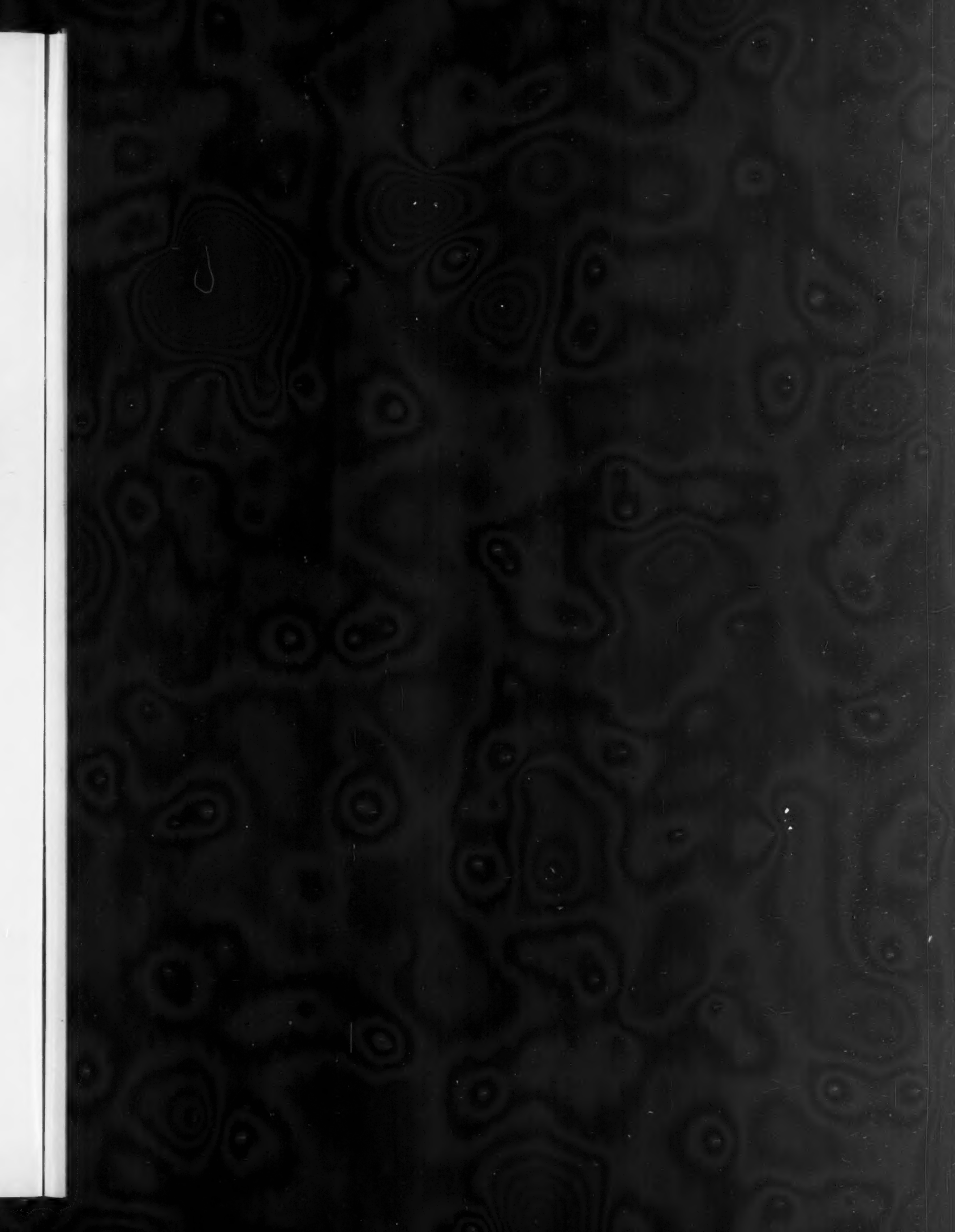
Probably the least expensive, yet most effective thing a dealer can do to advertise electric water heaters is to take time to write a few personal letters to selected prospects from among his former customers or friends and business acquaintances. The individual dealer's strongest asset is the friendship he has been able to develop through service to former customers. While many dealers in large cities may wonder whether the same method would apply to them, look at it this way: Even in a city a dealer develops about the same number of customers and friends that he would in a small town—only they are scattered in amongst the larger population, that is all. He can do just as effective a job of selling with the same effort and thought.

●

When letter writing comes hard, make them simple and natural. Talk as you would to the persons addressed. If you know them well, call them by first name. Bring into the letter some little detail of their own lives and tie it into your service to them through the sale of an appliance like a water heater. The letter at the left does that. For people you know less intimately, you can still be friendly without being fresh. Address them as Mr. or Mrs. instead of Al or Mabel, but there is no need to be stiff and formal. What you have to offer, hot water service, is a beneficial, friendly service. Talk of it as such.

●

Notice how some of the ideas from the inside of this Sales Guide are woven into the letter at the left. The The words in black type were taken from point 1, "Clean," the first of the list of 5 major advantages of electric water heating. In subsequent letters the other advantage points, "Healthful," "Peace of mind," "Long Life," and "Efficient" may be worked into your letter the same way. Every manufacturer of electric water heaters has literature from which you can lift catchy sentences, slogans, or advantage ideas in the same manner. Purpose of such letters is to obtain definite invitations for a slide-film demonstration and for a thorough discussion that should lead to a sale. Let letters save you time in finding live prospects.



"BACK-TO-THE-KITCHEN" movement in adult education has been started by the University of California Extension Division, Los Angeles, with the opening of a group of home economics and mechanical arts classes featuring the use of mechanical conveniences designed for the modern kitchen. Electric appliances, of course, come in for the largest share of comment.

●

SPRING SHOWINGS of new electric ranges were held in many sections of the West last month as part of the Modern Kitchen Bureau's national campaign. Utilities exhibiting were B. C. Electric Railway Co., Idaho Power Co., Montana Power Co., Pacific Power & Light Co., Portland General Electric Co., Utah Power & Light Co. and Washington Water Power Co. F. H. Harrigan, bureau field representative, assisted in organizing the showings.

●

GROWING INTEREST of the metal trades in electric heating and welding was proved by the exhibits at the Western Metals Exposition, Los Angeles, of equipment by fifteen manufacturers, two power companies. Reported W. B. Cheney, Southern California Edison Co. industrial heating engineer, to the PC EA Conclave at Fresno: "The showing served to stimulate interest among local manufacturers and gave us an opportunity to show prospects the equipment in action. The exposition gave electric heating its biggest boost in recent years." Total attendance was 36,394.

BEHIND THE EARS —by Russell

"Hurrah, our new bath-house and water heater are nearly ready! I can see you men can hardly wait."

APPLIANCE SALES REPORT

A Summary of Dealer and Utility Reports Compiled by Associations, Societies, Bureaus, or Dealer Contact Departments of Utilities

March, 1938	Idaho Power Co.[1]		L. A. Bureau of P. & Lt.[2]		P. G. & E. Co.[3]		San Diego Cons. G. & E. Corp.[4]		San Joaquin Lt. & P. Corp.[5]		Southern Calif. Edison Co. Ltd.[6]		Utah Power & Lt. Co.[7]		Wash. Water Power Co.[8]	
	Current	3 Mos.	Current	3 Mos.	*Current	2 Mos.	‡Current	2 Mos.	Current	3 Mos.	Current	3 Mos.	‡Current	3 Mos.	Current	3 Mos.
APPLIANCE																
Ranges	374	685	384	1,117	182	402	30	65	151	353	278	800			145	368
Water Heaters	112	180	125	390	93	230	25	70	62	152	89	297			71	205
Air Heaters, aux.	26	150	61	338	558	1,819	175	425	10	105	161	605			59	309
Air Heaters, 220			32	120	71	138			53	126						
Refrigerators	346	663	2,238	5,019	1,660	3,377	375	675	381	884	2,427	5,267			475	945
Dishwashers	1	1	12	45	5	14			8	27					1	2
Washers	274	1,033	1,413	4,282	1,784	3,761	300	575	246	768	1,678	5,372			390	1,044
Ironers	23	138	269	772	313	668	45	90	26	132	263	787			41	86
Vacuum Cleaners	88	263	392	1,428	1,625	3,432	225	400	103	303	837	2,420			187	520
Radios	575	2,315	2,348	7,369	8,252	16,447	950	2,000	538	1,768	4,333	12,508			905	3,134
Mixers	43	154	124	435	237	541	100	175	28	101	212	709			109	341
Cookers, Casseroles	15	243	81	224			65	115	17	92	83	196			339	617
Irons	356	1,070	616	1,658			400	750	235	757	906	2,797			599	1,749
Waffle Irons	79	381	205	615			150	300	65	255	308	1,019			195	505
Toasters	150	506					300	550	105	316	472	1,508			365	998
Table Stoves	84	245	208	559			50	110	83	134	332	780			92	504
Heating Pads	49	191	173	576			150	350	43	155	197	747			122	442
Curling Irons											49	118				
Coffee Makers	137	497	58	174			275	500	102	358	354	936			483	1,193
Sewing Machines	12	31			530	1,210	75	140							70	169
Clocks	82	262	178	569			325	625	129	472	474	1,596			51	519
Fans	7	23	100	116					2	5	100	143			26	73
Floor Polishers																
Sun Lamps	6	38	29	79							33	88			3	16
Reflector Lamps	255	992							158	368					1,901	4,738
Miscellaneous Lamps	92	618							136	450					721	2,002
Yard Lights									22	95						
Misc. Small Appl.			186	645			650	1,350	77	312	530	1,833				

Sources:

[1] Figures compiled by Electric Equipment Sales Association. Include power company sales and sales of all reporting dealers—about 60%

[2] Compiled by Los Angeles Bureau of Power and Light for territory served by that system.

[3] P. G. & E. reports sales of major appliances only based on accurate reports available from dealers' accounts. Ranges, water heaters and air heaters include company and dealer sales. *Lag of current and total figures is always one month greater than those figures of companies reported in other columns of this table.

[4] Gathered by Bureau of Radio and Electric Appliances of San Diego County. Estimated monthly sales figures used in this table: Miscellaneous figure includes fans, curling irons and sun lamps.

[5] Includes dealer reports from Midland Counties Public Service Corporation also. Compiled by Valley Electrical Supply Company.

[6] Includes reports from dealers on San Joaquin Valley system of company as well as Southern California areas served.

[7] Includes Utah Power & Light Company territory in Utah, Idaho and Wyoming. Also Western Colorado Power Company territory.

[8] Dealer sales only for Spokane and company territory. Company sales not included. Table stoves, grills included with cookers.

‡ March report was not received at time of going to press.

Today's and Tomorrow's Distribution Economics

By M. T. CRAWFORD
Puget Sound Power & Light Co.

THE Federal Power Commission uniform system of accounts defines the distribution system as everything between the primary source and the point of delivery to customers which is not included in the transmission system, and defines the transmission system as consisting of the lines and substations between the point of generation and the entrance to a distribution center, together with those lines whose primary purpose is to augment, integrate or tie together the sources of power supply.

On larger utility systems it is generally economical to provide an intermediate group of high-voltage distribution or sub-transmission lines—usually from 11kv. to 33kv. and in some cases of higher voltage—which form a network between the trunk transmission system and the distribution system of local primary feeders. In the broader sense of the term, the distribution system ordinarily includes not only the network of local overhead and underground lines covering the load area but also the distribution substations and high voltage lines supplying them, which may be fed from generating stations direct or from substations on the higher voltage trunk transmission system.

Planning Procedure

In planning a new system or in reviewing the design of an existing system in order to plan for the future, certain fundamental decisions must first be made. It is desirable to decide on the general type and voltage of the primary and secondary distribution in each load area, as this will influence the location and type of substations. The high-voltage distribution system may then be planned to provide the most efficient means of supply to the distribution substations from the primary sources, and the location and type of substations decided upon.

It is seldom that the engineer gets an opportunity to design and install a comprehensive distribution system outright and complete. Such systems are usually the result of a process of growth and evolution. The usual engineering problem is, therefore, one of shaping the trend of growth in order that the development may be toward the most efficient ultimate plan and at the same time may provide economy from year to year while growth is taking place.

In the routine daily planning of small additions, reenforcements and extensions to a system, it is important that we do not follow the path of least resistance, but have a definite plan mapped out in advance with provisions to insure that the plan will be followed. Mass production methods are essential to such a "planned economy" for the distribution system. A fair sized system may require from 800 to 1,000 work sketches per month. These are needed to cover planning of line work jobs which involve a change in plant, and which may average only $100 or so each in cost. Obviously, printed standard plans and specifications with simplified work sketch procedures and other mass production methods are justified for distribution engineering.

A standard type of local primary and secondary distribution should be decided upon for each general class of service area encountered in the territory, such as farm, residential, commercial and industrial service areas. Separate standard types should also be outlined for residential underground and commercial underground in heavy load density areas. Having selected and standardized on the general characteristics for each type of local distribution, general standards should be prepared for the type of substations adapted to the supply of each type of local distribution from the high-voltage distribution network.

After the general design standards have been worked out, it will be found economical to complete standardization of the principal details of construction, such as pole line installation, guying, stringing conductors, installing transformers and equipment. Standard specifications can be established for many material items. If judgment is used and the standardization is not carried too far, it will be found that adequacy may be obtained at minimum cost by such procedure. While certain situations will sometimes require special engineering to fit the economics of the immediate needs, an orderly plan of development cannot help but evolve if these general plans and standards are prepared in advance and conscientiously followed.

Local Primary and Secondary Systems

The three-phase, four-wire star system possesses so many advantages that its use is steadily increasing for both primary and secondary distribution. An exception is made for light load-density areas with little need for polyphase service, in which a single-phase distribution will frequently be found most economical. In heavy load-density areas, even with single-phase load predominating, the 120/208-volt, 3-phase, 4-wire secondary mains are generally found very economical, although having a disadvantage in requiring polyphase metering for 3-wire, single-phase loads, and in having a rather low voltage for 230-volt equipment.

In the radial type of system, the load area is supplied by lines which extend radially from the source of supply without any considerable amount of interconnection in the load area. This type of system is generally felt to be most economical in areas of comparatively light load density. In a network type of distribution there is more or less interconnection in the load area, in the general form of a grid. A loop system is considered as a modified type of network. In general, networks have been found to present better economy and continuity in heavier load density areas, but their economy and successful performance depend upon the skill and judgment used in their design.

The foregoing discussion applies in a general way to : (a) the low-voltage secondary system between distribution transformers and customers' premises, (b) the primary feeder system between the distribution substation and the line transformers and (c) high-voltage supply lines between the transmission substation and the distribution substation. Any one or more of the three parts of the system may be either radial or networked depending on the conditions.

The low-voltage secondary lines represent proportionately heavy copper costs. By banking or paralleling groups of line transformers together on secondary mains, both a transformer economy and a copper economy can be realized as soon as the load density begins to exceed approximately one service drop every 400 ft., and these economies reach their maximum in the heavy load-density areas in the downtown business districts of cities. With good design it is possible to keep the ratio of the primary feeder peak load to the sum of the ratings of line transformers at unity or above, which cannot be done with isolated transformers.

There may be some dissenting votes in connection with the above, since there are some distribution systems which try to avoid banking distribution transformers together, and since, in a few cases, there are large cities which still employ radial secondaries from

isolated distribution transformers. Certainly the radial secondary is most economical for rural distribution where the distance between the service drops is considerable and where the transformer cost per mile is found to be less than if an attempt were made to string in secondaries for parallel operation. In the case of service to an industrial or other large customer, without other similar connections in close proximity, the radial secondary is undoubtedly most economical. Calculations will show, however, that banked operation of transformers on secondary mains or networks begins to prove more economical as soon as conditions approach a more or less uniformly distributed load of numerous service connections.

Those who hesitate to network their secondary systems under such conditions may do so because they fear the system will not be self clearing in case of trouble, or will suffer from transformer burnouts and service interruptions. It is at this stage of the "Planned Economy" that the skill and judgment of the designer is needed, and there is no simple formula which can be applied without reservations.

There are, however, several means of safeguarding against interruptions and transformer burn-outs. In the heaviest load-density areas network protectors can be economically installed on the secondary side of line transformers and primary feeders interleaved, and if properly designed, the secondary mains should burn clear of short circuits. This is recognized as the a.c. low-voltage network type of distribution, now used in over 90 of the country's largest cities.

In lighter load-density commerical areas of smaller cities, the use of network protectors may not prove out on an economy basis, but skillful use of selective fusing can be made to protect the service and equipment in a very high percentage of cases. In residential distribution and small towns, a proper control of the impedance in the secondary mains with relation to the transformer size and spacing, particularly if the secondary mains are interconnected in a form of mesh or grid, will make the network self clearing in over 90 per cent of the cases of wire trouble and transformer failure.

The multigrounded common neutral scheme of local primary and secondary distribution is one of the most economical developments available to designers, where the neutral conductor of a star primary system may be combined with the secondary grounded neutral conductor, and only one wire strung in for both purposes. Distributed grounds must be installed on the common neutral for safety, and care must be used in providing inductive coordination with communication circuits.

High Voltage Supply Systems

Design of this part of the system will vary with the load-density characteristics of the area. Where the load is more or less concentrated in communities with relatively large undeveloped areas between, supply lines at fairly high voltage may be necessary. In the opposite extreme of a considerable amount of load distributed over the areas between communities, such as in irrigation pumping areas, it may be found more economical to employ a lower voltage, on the order of 11 or 13 kv., in order that the moderate priced distribution transformers may be hung frequently to serve individual customers. Distribution substations on such a network would be installed only at built up towns where a primary voltage of 2 or 4 kv. would result in an economy.

Three-phase, four-wire star types of-

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fer advantages in many cases, but delta systems are often equally economical and more flexible. While radial systems are more generally used, particularly in lighter load-density areas, there has been a definite trend toward primary network systems for heavy load densities in order to avoid excessive substation costs.

In the primary network system, high-voltage supply lines are usually looped or interleaved so as to provide two sources of supply to step-down transformer substations, which are in the form of simplified outdoor units. The primary distribution feeders become tie lines between the outdoor, unit-type substations, with relay protection and reclosing features at each end, so that the various substations are normally operated in parallel. Local distribution is supplied by branches and taps from the tie line primary feeders. By providing automatic switching features and by designing the primary feeders to be self clearing of troubles, one can develop a high class of service from the primary network, but it requires a fairly high load density to be economically justified.

In a growing suburban area on Puget Sound it was found economical to plan for an ultimate primary network but to omit the more expensive automatic features at first. Two 13,800-volt lines are carried through the area along with simple outdoor unit-type transformer installations, spaced about every 2 mi., with 2-kv. tie lines and distribution feeders. As the area is built up, automatic switching equipment and relaying are added. The primary voltage will be raised to 4 kv. when the load increases.

Economics

Under present conditions, many utilities find it unwise to make any permanent investments that can be avoided. A decision in regard to the best policy in this regard must be made for each property. A value must also be set for the energy losses which may be saved or recaptured by expenditures for additional copper or more efficient types of equipment or design. This will have a different value on hydro and steam generating systems.

Each feature of design should have its own economic consideration, and this should be reviewed in its relation to the whole. When, as is usually the case, the study has to do with extensions and reinforcements on an existing system, compromises may be necessary in order to utilize investments already made with the least loss.

The probable ultimate useful life should be given a definite place in the picture when planning distribution investments. A financial balance must be struck between sums spent for extra durability with compound interest thereon, and the cost of more frequent replacements. For instance, it is doubtful if the preservative treatment of cedar poles will pay out in sections of the Northwest where poles are cheap and last twenty years without treatment, except where unusually heavy labor cost is involved in the installation of the pole and fixtures or equipment thereon.

An important point of economy control is the book of standards. Local conditions will influence standard practices, as designs will vary with climatic loading, prevalence of lightning, local costs and many such factors. Bare overhead live wire may, with economy, be extensively used for all voltages where open conditions prevail, but its use may be limited where trees and brush are a problem. Auto-transformers may be economically used for small transformations between high-voltage supply lines and local primary feeders, where star systems are used. The fusing practice is an important detail, as money can often be saved by fusing branch primary lines at the tap point and omitting the fuse at the transformers. Secondary fusing for transformers will also be found cheaper than primary fusing under proper conditions.

Reconditioning High-Tension Bushings

By A. E. FREY
Pacific Power & Light Co.

DURING the past few years, Pacific Power & Light Co. has done some experimental reconditioning of high-tension bushings, much of it following methods which have been used elsewhere. Bushings located in power transformers, oil circuit breakers and instrument transformers in the 25 to 66-kv. range have been the subject of work thus far. No particular attention has been paid to the economics involved since the effort was to discover what could be accomplished in the field without purchasing special tools and equipment, and without having to return the bushings to the manufacturer for repair.

The term "reconditioning" as used in this paper refers to the rebuilding of bushings which are defective from the standpoint of radio interference and not to bushings which are defective through major mechanical failure.

Whether or not a bushing is a source of radio interference has been the deciding factor in this work. We feel that if a high tension bushing is responsible for radio interference, it is a potential source of trouble to ourselves and to our customers, and should therefore be removed from service. In our territory, broadcasting stations are not as powerful as elsewhere. Hence interference from high-tension apparatus is very noticeable over wide areas. This interference is not only due to defective bushings, but also due to defective high line insulators, faulty bonding of hardware, etc., etc., and we have found that it is useless to recondition the transmission line equipment without properly coordinating the apparatus at the stations.

No Rules on Bushing Action

Radio interference from high tension bushings is invariably caused by corona discharges, which may grow out of cracked compound, oil migration, low oil, etc., in compound-filled bushings. In oil-filled bushings, similar causes are responsible, in particular defective spacers or insulating cylinders. Bulged or otherwise distorted ground shields are also a source of interference.

It has been our experience that once a bushing starts to cause interference, the process usually grows worse. We have noted instances in which bushings failed completely three months to one year after interference was first detected. But, on the other hand, we have bushings which have been in service for years without showing appreciable change in interference level. Consequently, no fast and definite rules can be laid down as to how a bushing will act, but apparently the safest thing to do is to remove it as soon as possible. Incidentally, with but one exception, our post mortem inspections have definitely indicated that our failures were not due to moisture, which apparently has been the main source of trouble in other parts of the country.

Tests on 51 compound-filled bushings in the 66-kv. class, both on our own and an associated system, showed 24 bad bushings from the radio interference standpoint, some of them causing considerable disturbance. The power factor method on the same bushings did not show one defective. In all cases where the radio method showed a good bushing, the power factor method concurred.

The Physically Impossible

We realize, however, that the radio method has limitations and that it would be physically impossible to recondition all bushings which show interference. Also considerable experience is required to make a competent analysis after interference is detected, and special precautions have to be observed when the defective piece of equipment is removed from its associated apparatus and tested. While it is theoretically possible to have a high power factor and no corona discharges, such is very rarely the case and I know we would not be concerned about such a bushing.

Although we have many kinds of bushings in service, our main trouble has been with the compound-filled, both old and new. We have on hand, for instance, a new bushing which has never been used for the simple reason that it causes radio interference when normal operating potential is applied. Our tests show that interference may start as low as 6 kv. on a bushing which is supposed to operate at 66 kv. While the interference may be barely audible at 66 kv., interference at normal operating potential may be so bad that no radio equipment is necessary to tell that there is something radically wrong. A power factor test on such a bushing may or may not show any unusual condition.

Some of our troubles with compound-filled bushings have been caused by air spaces in the compound. Others have been caused by defects in the ground-shield assembly, usually near the top of the shield. In still other cases, trouble has persisted after completely rebuilding the ground shield and refilling the shell with compound or oil. In most instances the corona formation voltage has been raised by completely rebuilding the bushing, but in many cases rebuilding has had no effect whatever. In such cases, it seems apparent that some defect must exist within the core itself.

To satisfy ourselves on this point, we have made the following tests on some cores having low corona formation voltage: with the ground shield removed the core is centered in the shell to which a section of iron pipe is attached, extending about 16 in. below the bottom of the shell. This leaves about ½ in. space around the core. Voltage is applied and slowly raised to the value where corona formation is noted by the radio test. The tube is then filled with oil and the test repeated. Addition of oil has the effect of raising the voltage gradient in the paper and the corona formation voltage is therefore lowered. If with corona formation voltage applied to the bushing, oil is slowly poured into it, a very noticeable increase in radio noise is noted when the oil reaches some level included in the iron pipe. After this point is reached, the interference is not affected by the addition of more oil. This test would indicate the existence of some air space in the core. This might be in the form of a blister at the surface of the conductor or at some other point in the paper. It is our belief that a core of this kind will eventually fail and that it should be removed from service on the evidence that corona formation takes place. In no instance when the core tests defective, have we been able to recondition a bushing so that it could be replaced in service.

Draining Compound

Draining compound from a bushing has followed conventional methods. After a bushing is removed in the field, it is tagged and shipped to a central shop, where all repair work is performed. The bushing is then inverted in an electric oven. Drain plugs or gaskets are removed and heat gradually

raised to 100-120 deg. C. No fans are used to circulate the air, but holes at the top and at the bottom of the oven assist air circulation. After the compound has drained out, temperature gradually reduced to normal. The core is then removed from the porcelain shell and any compound or other matter is cleaned out by scraping and washing with carbon tetrachloride. The inside of the shell is cleaned in a similar manner. The core is then tested alone for radio interference as outlined above. The suspending of the core and submerging the lower terminal in a tank of oil for this test has proved to be entirely unsuccessful. If the core tests OK and unless other evidence is found, it is assumed that the original trouble was due to a defect in the compound.

We have found in numerous instances that the static ground shield was bulged or otherwise distorted. In this condition, the shield, instead of distributing the electrostatic field, causes a concentration, which again may give rise to interference. If the core and static shield are in good condition, they are put back in place. New cork gaskets are used, these being painted with "glyptol" before installation. The bushing is placed in the electric oven and heat gradually raised to 100 deg. C. Compound is then heated about 20 deg. higher than the bushing and, after it has reached a thorough fluid stage, is poured in one operation. The bushing is kept at this temperature for several hours and more compound is added if necessary. During the pouring process the bushing is suspended vertically and not moved. Pouring the compound under pressure, which has been done in Europe to some extent, has not been tried in our work.

Re-Draining the Compound

We find at times that it is necessary to re-drain the compound, since an interference test shows that sufficient improvement has not resulted. Small air bubbles in the heated compound are almost unavoidable and they apparently are disturbing factors. If the second filling does not remove the trouble, the ground shield is removed and core tests made as mentioned above.

In view of the fact that our oil-filled bushings have never given interference trouble, we have endeavored wherever possible to convert our compound-filled bushings to the oil-filled type. While the core and internal construction of the two types of bushings are in general different, we find that in most cases the conversion can be made without any radical changes. Although the finished product may not be electrically balanced, these rebuilds have proved quite successful.

We had quite a number of 66-kv. oil circuit breaker bushings which consist of a single porcelain shell and standard bolting flange. These bushings were not filled with either compound or oil, and the conductor was a bare 3/8-in. copper rod. This type caused considerable interference. When the rods were removed, air-exposed surfaces were found to be thickly coated with copper nitrate. Calculations indicated that the air in the bushing was stressed between 38 and 40 kv. per cm., and that corona formation had undoubtedly been going on for years. The removed rods were cleaned and cut off on the lower end so that they would protrude about 2 in. below the bushing shell. These lower ends were then threaded. A cork, which was bakelized and which had a central hole somewhat smaller than the conductor, was driven in the lower end of the bushing. A fiber washer was slipped over the threaded rod and the nut tightened. Next, the bushings were filled with the proper tested mineral oil to the top.

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Inspection after four years of continuous service showed only a small loss of oil, resulting from expansion during the summer months, the loss occurring over bushing top. Radio interference from these bushings is negligible and the interference level has not changed.

Specific example was a compound-filled 66-kv. bushing which had been giving trouble. The usual methods were applied to remedy the situation, but since the bushing could not readily be converted to the oil-filled type, another filling medium was used. After the compound had been melted out and it had been definitely determined that the trouble had been in the compound and not the core, some fine white sand was obtained, heated for several hours to remove any trace of moisture and poured into the bushing. Then oil was added. The lower end of the bushing had been sealed with a thin untreated cork gasket. This bushing was in service for over one year, and while imperfect, was usable.

On smaller 25-kv. bushings, neither oil nor compound filled, good results have been obtained by wrapping the bare copper conductor tightly with varnished cambric tape, conductor and tape being forced into the cylindrical hole of the bushing shell. No attempt was made to make the lower end of the bushing oil tight. As a matter of fact the taping was extended to reach below the oil level in the tank and capillary action has kept the tape well soaked. These bushings have given an excellent account of themselves.

In some instances it has been impossible to recondition bushings when it should have been done. In order to give temporary relief, the good neutral bushings on power transformers were interchanged with the bad phase bushings. We have a limited supply of good bushings on hand but quite often we find that the stock we have on hand will not replace a particular kind of bushing without complete remodeling.

Problems to Be Solved

As indicated, our principal aim has been to convert the compound-filled bushings, which have to be reconditioned, to the oil-filled type or its equivalent. There may be certain instances where compound-filled bushings have to be used either for electrical or economical reasons. The compounds which are available at the present time set hard in cold weather and become fluid in hot weather, and contraction and expansion undoubtedly encourages the formation of cracks. It would appear that something more suitable could be developed which would have the same electrical characteristics, but a much smaller temperature coefficient. It is also evident from our investigations that not sufficient attention has been given to the radio interference problem originating from high tension bushings. To us, this interference is of the utmost importance and between a bushing that shows high power factor, say 4 to 7 per cent, but causes no radio interference, and a bushing of low power factor but showing decided radio interference, the former bushing would be preferred.

Oil-filled bushings, so far, have given no trouble on our system. Of course we have had some complete failures which may have originated in corona formation under oil, finally puncturing the porcelain shell and causing complete destruction. This corona formation may have been due to impure oil, defective spacers or static shield.

Since the oil in oil-filled bushings is very rarely tested, especially in the old type of bushings which were not provided with a sampling arrangement, replacing the clear conservator glass seems advisable. Amber colored conservator glass, which excludes the destructive actinic rays of the sun and thereby aids in the preservation of the oil, may be a step in the right direction. We have had no operating experiences from these new glasses on our system, but conversions are under way.

Breakers Relieved

Replacement evaded by relay scheme

By R. RADER
Puget Sound Power & Light Co.

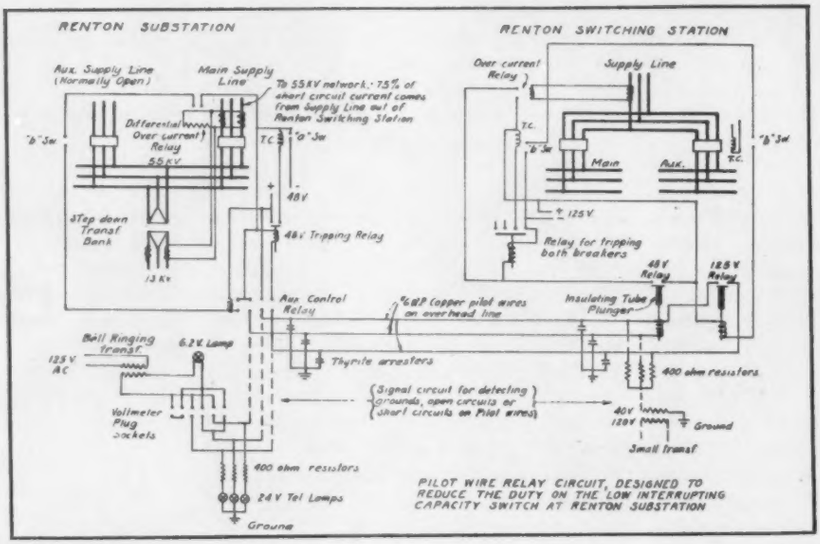
LIGHT-DUTY circuits and low-capacity transformers, when supplied from a closely linked transmission network, generally require circuit breakers having a heavier interrupting rating than those on the main grid. In such cases, the circuit-breaker cost per kva. of load served becomes abnormally high.

Oftentimes an interrupting duty in excess of the rating is found to exist in circuit-breaker installations of this type, due to a gradual increasing of the generating and synchronous capacity connected, and to a strengthening from time to time of the transmission grid. The simplest way to relieve the resulting short circuit hazard is to replace the over-dutied breakers with those of larger capacity, but the heavy costs involved may cause postponement of replacement until the hazard becomes exceptionally great. One case of this nature was handled in a somewhat ingenuous way by an inexpensive relay scheme which permits the station faults to be cleared in the proper manner, yet the breaker duties are kept within their rating without resorting to expensive replacements.

In Fig. 1 is a small-capacity substation served from taps to supply lines, these supply lines being portions of a transmission grid converging at Renton switching station. The oil circuit breaker at the substation not only protects against 55-kv. bus faults, but transformer protection is also supplied through the use of differential over-current relays.

When trouble occurs in the substation it would be permissible to clear the trouble by dropping the supply line at the nearby Renton switching station and at the generating end of the line, and at first thought it might seem possible to accomplish this by simply making the 55-kv. breakers at the substation non-automatic. However, this scheme would not permit the low energy settings needed for transformer protection, especially should faults occur on the 13-kv. side of the transformer.

The method as developed was a modification of this idea, in which the supply line is automatically opened at Renton switching station, but left connected at its remote end. The reduced short-circuit current is then successfully interrupted by the low duty breakers at the substation, thus isolating the trouble from the system.



The relay circuit operates as follows, events taking place in the order listed:

1. A short circuit causes the differential over-current relay at the substation to close contacts.
2. The auxiliary control relay becomes energized, its contacts close, thereby energizing the 48-volt relay at Renton switching station over the pilot wire circuit.
3. Closing of the 48-volt relay contacts at Renton switching station closes the trip circuit of the supply line oil circuit breakers at the switching station, and the opening of these breakers reduces the short circuit to about one-fourth of its original value.
4. The closing of the "b" switches of the circuit breaker at Renton switching station energizes the 125-volt relay at this station which in turn closes the circuit of the tripping relay at Renton substation, and the breaker opens, clearing the trouble.

The diagram also shows a signal circuit used for detecting trouble on the pilot wires. The pilot wire circuit consists of three No. 6 W.P. conductors installed on crossarms of an existing pole line, the distance between substations being 4,700 ft. A small, specially wound, single-phase potential transformer, 120/40 volts, is continuously connected to the pilot wires at Renton switching station through 400-ohm resistors. At the substation end, three 24-volt, .032-amp. telephone lamps are connected to the pilot wires through 400-ohm resistors. These lights will go out or burn dim when grounds or open circuits occur on the pilot wires.

In testing for short circuits between pilot wires, a bell ringing transformer is used as the source of supply, connected, through a 6.2-volt, 0.3-amp. flashlight lamp, to the circuit, by means of voltmeter plugs, normally disconnected. Insertion of the plug in the first position will test the lamp; when inserted consecutively in the other three positions the lamp will not burn if the circuit is normal but will burn if a short circuit exists between phase wires.

This relay scheme would not be applicable where high-speed clearing is essential, but where breakers of the slower speeds (15 or 20 cycles) are used the additional time lost through relay sequence and breaker sequence is not a serious sacrifice. In this particular application the time from the closing of the differential over-current relay to the clearing of the circuit is approximately 0.9 sec., while the best speed with direct tripping would be about 0.5 seconds. Since the short circuit is greatly reduced in the first 0.5 sec. and no stability problem is involved, the merit of the scheme consists of a favorable balance between the saving in breaker replacement as against the increase in equipment damage due to the 0.4-sec. delay in clearing the fault.

Considering the fact that the expenditure for new breakers would be real while the increased loss due to equipment damage is quite problematical, the relay scheme has a distinct advantage. This advantage is emphasized in locations where the protected zone is short or has limited exposure to trouble. Investment in oil circuit breakers is a form of insurance, and the premiums paid should have a reasonable relationship to the benefits expected.

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Six Years of Glass-Bulb, Mercury Arc Rectifiers

By J. H. STEEDE
B. C. Electric Railway Co.

GLASS bulb rectifiers of comparatively small current output have been used for many years for converting alternating to direct current for battery charging, supplying series arc lighting circuits and other loads of small capacity. During the last fifteen years, particularly in Great Britain and Europe, they have been successfully applied on an increasing scale for many miscellaneous commercial power conversion purposes and for providing d.c. for electrical traction.

Experience with such equipment on the system of the B. C. Electric Railway Co. covers approximately six years. In 1932, two small units were purchased and installed to supply 550 volts d.c. for elevator operation by two existing commercial power customers. These units were of the single-bulb, 3-phase type, one of 50 hp. and one of 15 hp. rating; each taking power from a 3-phase, 220-volt, secondary distribution circuit through a self-contained O.I.S.C. transformer.

These 3-phase transformers are equipped with auxiliary windings to supply low-voltage power for excitation and, in the case of the larger unit, for operating a cooling fan. The excitation circuit consists of a device for striking the arc and a single-phase auxiliary load circuit to maintain this arc through two auxiliary anodes, regardless of the load on the main anodes.

In starting the initial arc, a flexible electrode inside the bulb is pulled down by an a.c. starting coil placed directly beneath the electrode outside the glass, and the flexible electrode dips into the mercury pool. This action immediately opens the coil circuit, the electrode is released and in springing back opens another auxiliary circuit through the flexible electrode and the cathode, which strikes an arc at the surface of the mercury and vaporizes sufficient mercury to permit the auxiliary anodes to pick up their load. The rectifier is then ready to take load on the main anodes. Fig. 1 shows the 15-hp. unit.

A series reactor, to give a smoother wave form of output voltage, is inserted in the negative lead, inside the transformer, between the neutral point and the negative terminal.

Protection against overload is provided in the form of fuses in the incoming supply and in each anode lead. Fuse protection is also provided in the auxiliary circuits.

Fig. 2 shows the 50-hp. unit, which is of similar design except for the addition of the cooling fan. This fan is mounted directly under the center of the tube and provides a movement of air upward around the anode arms and condensing chamber. The auxiliary transformer supplying the 3-phase fan motor has its primary windings in series with the leads from the main transformer to the anodes. The voltage induced in the secondary of this transformer then is a function of the load on the rectifier, and in consequence the fan motor speed also varies with the rectifier load.

Except for a few minor troubles, originating mainly in the fuses and control circuits, both of these units operated successfully 24 hr. per day until June 1937, when the 50-hp. bulb failed through loss of vacuum and was replaced. The cause of this loss of vacuum has not been definitely determined, and the bulb has been sent to the factory for investigation and possible repair.

In 1936, a 330-kw. glass-bulb rectifier, made up of two bulbs, each of 165-kw. capacity, was ordered for traction purposes. This unit was installed in December of that year at Sasamat Substation to relieve the load on the existing convertor station at Dunbar by supplying power at 550 volts for the operation of the Sasamat car line, which up to this time had been served by a stub-end railway feeder from Dunbar Substation. Energy is supplied to this unit through an O.I.S.C. transformer, connected on the primary side for 4,000 volts delta and having a 12-phase secondary winding connected in quadruple zigzag. The bulbs are of a six anode type and operate as two independent 6-phase rectifiers with a phase displacement of 30 electrical degrees.

The excitation circuits are similar to those on the small units previously described. The voltage to the fan motors is still a function of the rectifier output, but in this equipment a three-core saturating reactor is used in circuit with the leads from the auxiliary winding to the fan motors. The main d.c. output from the transformer neutral is taken through windings on the outer legs of this reactor. At light loads the reactance is high, giving only sufficient voltage to turn the fans slowly; but above half load the d.c. field saturates the core, lowers its reactance, gives

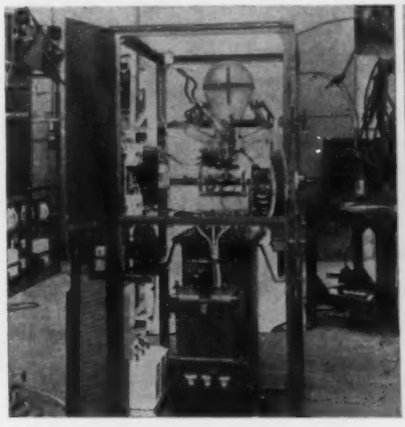

FIG. 1—15-hp. unit

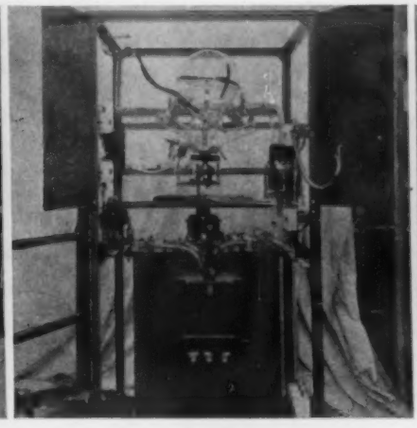

FIG. 2—50-hp. unit

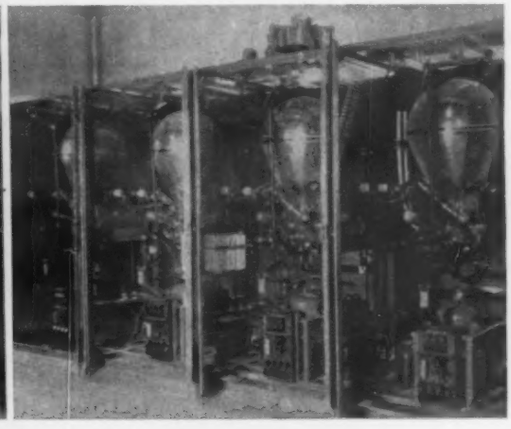

FIG. 3—660-kw. traction unit

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practically the full voltage of the auxiliary windings at the fan motor terminals and maintains full fan speed at the heavier loads.

Three inter-phase transformers are necessary with this transformer connection. These are enclosed in the main transformer tank, as is the d.c. reactor just mentioned.

Anode fuses of the tetrachloride type, similar to the well known S. & C. fuses, are supplied. They have a high rating and their purpose is not to provide normal overload protection but to protect the bulbs under short-circuit conditions, or against internal short-circuits.

A feature of this traction equipment is the d.c. high-speed reclosing circuit breaker and its control relay. This breaker is exceedingly fast. On opening under short-circuit, it is claimed that the current reaches a maximum and is reduced below the dangerous level in approximately .005 second.

A small high-frequency choke and condenser are provided to eliminate harmonics of radio frequency from the voltage supplied to the trolley. There is no evidence of radio interference caused by this apparatus, but some trouble has been experienced with harmonics of telephone frequencies. With the 12-phase operation provided, it was thought that these harmonics would be of such low amplitude that no additional smoothing equipment would be necessary. This, however, proved not to be the case. A temporary series reactor was made up and installed, and it served until permanent smoothing equipment in the form of resonant shunts and a smaller series reactor was provided by the manufacturer.

Apart from this difficulty, which was not of a serious nature, the operation of this station has been entirely satisfactory. No shutdowns, except for occasional cleaning and inspection, have occurred since its installation.

In August 1937, a unit of the same capacity was installed at Sapperton to supply d.c. energy for the operation of the Sapperton end of the Vancouver-Burnaby Lake Interurban Line. This unit is practically a duplicate of that at Sasamat, except that the main transformer is designed to take power at 12 kv. and is connected double 3-phase on the secondary with one inter-phase transformer for 6-phase operation. The bulbs are identical with those at Sasamat, but operate in this case in straight parallel with no phase displacement.

Smoothing equipment consists of a series reactor and resonant shunts for the 6th, 12th, 18th and 24th harmonics and is housed in a separate cubicle. No outages have been experienced on this unit since its installation.

A third traction unit of double the capacity, made up of four similar bulbs, (Fig. 3) has been put in service recently at 41st Ave. and Dunbar St. to improve voltage conditions on the South Dunbar and Kerrisdale car lines in the City of Vancouver. This installation is known as Southlands Substation. Power is supplied to this 660 kw. rectifier from Carnarvon Substation by a 4-kv. feeder. The main transformer is delta-connected on the primary side, and double 3-phase on the secondary, to give 6-phase operation as at Sapperton. The auxiliary equipment is similar to that in the previous installations.

Three high-speed circuit breakers—one, the main breaker, the other two, feeder breakers—are provided. Reclosing relays control the feeder breakers, but the main breaker normally stays closed on feeder overloads. It will open on heavy over-current and reclose immediately. A relay is provided to prevent pumping of this breaker in case of a bus-bar fault or for reverse current. An inverse-time overload relay will function to open the feeder breakers on sustained primary overload. These feeder breakers also open in case of failure of the a.c. supply.

Smoothing equipment is provided in a separate cubicle similar to that in the Sapperton installation. Interference conditions appear to be satisfactory both for radio and telephone frequencies.

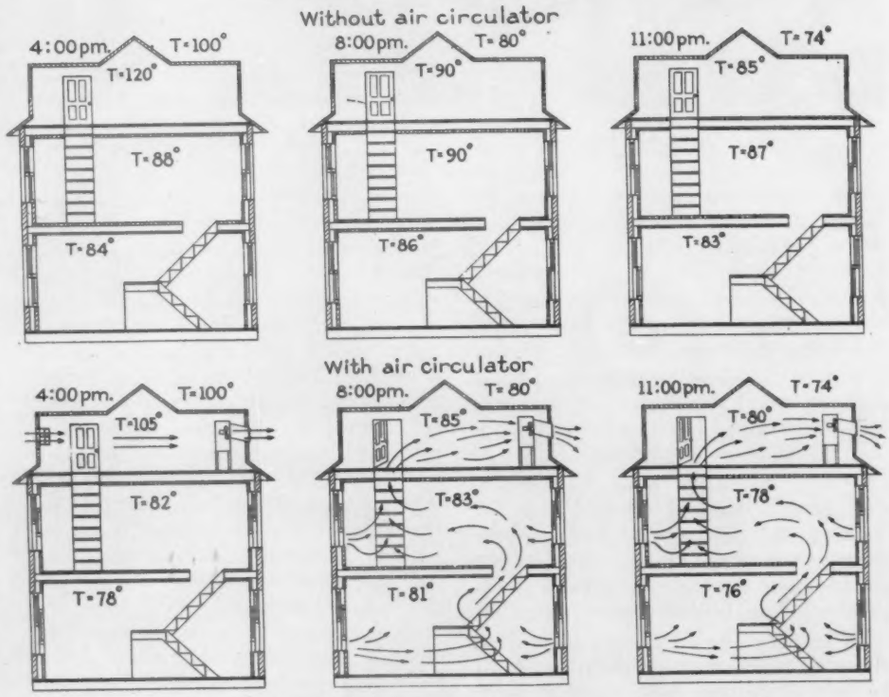
The guaranteed efficiencies of these rectifier sets are high—93 per cent at full load and half load, and 91.5 per cent at quarter load. The overload guarantees are 25 per cent for two hours, 100 per cent for five minutes and 200 per cent momentarily.

Glass bulb rectifiers have definite advantages over rotating apparatus in that they require no heavy foundations, are comparatively free from noise and are particularly adaptable to automatic operation. They have few moving parts; consequently, the maintenance costs are low.

Compared with the single metal tank mercury arc rectifier, they require neither circulating cooling water nor auxiliary apparatus to maintain their vacuum; and they have the advantage that, in case of a bulb failure, a spare bulb can be readily installed, or the unit can be operated on the remaining bulbs, at reduced capacity, until it is convenient to replace the defective bulb.

On the whole, the B. C. Company's experience with this type of equipment has to date been very satisfactory.

Easy Lesson in Keeping Cool


Without air circulator
4:00pm. T=100° T=120° T=88° T=84°
8:00pm. T=80° T=90° T=90° T=86°
11:00pm. T=74° T=85° T=87° T=83°
With air circulator
4:00pm. T=100° T=105° T=82° T=78°
8:00pm. T=80° T=85° T=83° T=81°
11:00pm. T=74° T=80° T=78° T=76°

How air temperatures vary throughout a home during the day is concisely visualized in a study made by General Electric Co. in connection with the announcement of a line of air circulators by its air conditioning department. Lower temperatures prevail in the ventilated house shown at bottom. At left, the attic is being cooled during the afternoon, while at lower center and right the open door allows air to be circulated throughout the house during the evening

Ray Gardens

What electricity has done for Mr. and Mrs. Charles Ray

By C. A. ROOT
Sales Supervisor
Northwestern Electric Co., Vancouver

Six years ago Mr. and Mrs. Charles Ray of Vancouver, Wash., originated the "Ray Gardens." Three small hotbeds were hastily put together and covered with old window sash. Ready-made market, there was none. Finally a customer was found here and another there and the Rays were able to carry on.

Mr. and Mrs. Ray knew how to raise seedling plants that would thrive when transplanted. Satisfied customers were soon telling their friends about Ray plants and sending in repeat orders of their own.

Result: Today the Rays' hot-houses cover 6,000 sq. ft. of space, and there are ten outside cooling beds. Their business is now strictly wholesale and has grown to the point where the Ray Gardens supply approximately three-fifths of all vegetable plants sold for transplanting in southwestern Washington. This, in addition to their flower plant business.

Secret of the Ray success is best expressed by him: "The most important requisite for a seedling that is to be transplanted is a fully developed root system." To get this result the Rays use electric soil heating cable.

One hundred and thirty ft. of cable are spread back and forth in the sand laid atop one of the long benches. On this sand, warmed by the cable, are set 30 seeded flats at a time. By means of a thermostat set in one end of the flat the temperature of the soil is then kept at any degree desired.

Once a flat is placed on this electrically heated sand the seeds begin to sprout. Cabbage and lettuce seeds are out of the ground in 24 to 36 hr. Tomatoes take 36 to 48 hr. and peppers approximately 48 hr.

This is the crucial point in the plants' development. Says Ray: "When the plants are well up I carefully balance the temperature in the flats against the moisture I give them. By curtailing the moisture, the warmth below will draw the roots down and even the tiny, hairlike branches characteristic of fully developed plants will form rapidly. I can actually produce 2½-in. root systems on plants no more than 1 or 1½ in. above ground. And I can do this with cabbages, tomatoes, peppers, cauliflowers, etc., in from four to seven days after planting."

That the system works is proved by the experience of a local Chinese gardener. He transplanted 3,600 tomato plants on ground not previously or later wetted—and lost just one plant. Pepper plants, transplanted by means of a planting machine in the same sort of ground, did almost as well.

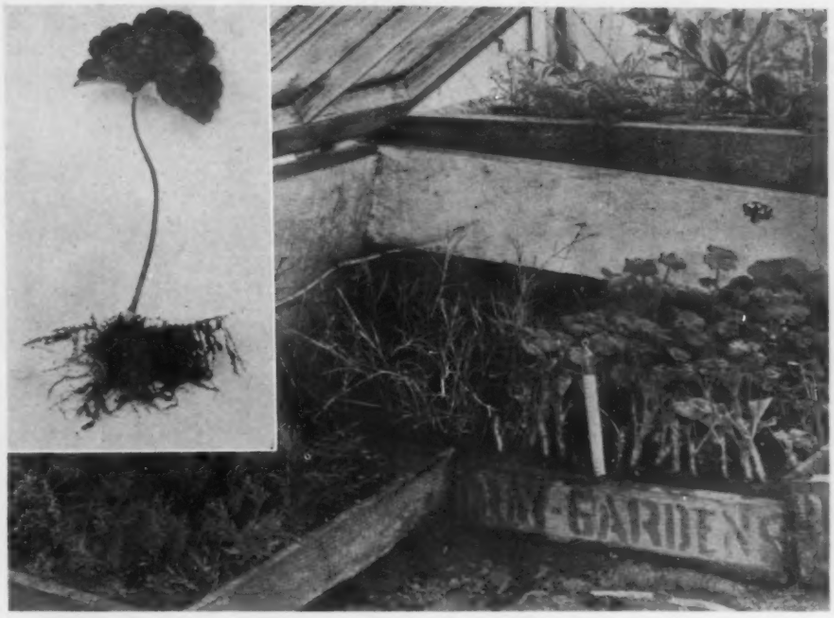
Last season, from 700,000 to 800,000 vegetable seedlings were germinated and developed for transplanting by the Ray Gardens. This season promises to be even busier, additional facilities having already been prepared.

In the autumn the soil heating cable again comes into use in the propagation of various plant and shrub cuttings. And the "take" on even the most difficult specimens is often ten to fifteen times as good as with ordinary results, and months of time are saved.

Equally fine results have been experienced in the germination of flower seeds. Salvia, for instance, almost impossible of germination under ordinary conditions, pops out of the ground in a hurry when transplanted over soil heating cable and a temperature up to 80 deg. is maintained.

Another interesting experience of the Rays concerned the germination of gladiola bulblets. A large number of these were planted in the field in February. Others of the same stock were planted over soil heating cable. These last, almost 100 per cent strong, were well up in less than six weeks. Many of those in the field, however, were just sprouting when dug in September; and the total take was less than 50 per cent.

With certain of these bulblets worth from 5c to $5 apiece it is no wonder the Rays believe in electricity.



A corner of the Ray electric hotbed in which geranium, evergreen and carnation cuttings have been set to root. Insert—A Coral Bell cutting roots in about three weeks when set over the hotbed

Cold Storage

How a farmer, who dislikes canned food, stores meat, etc.

By BEN W. FABER
Rural Service Representative,
Portland General Electric Co., Hillsboro, Ore.

When Tom Goodin of near Hillsboro, Ore., killed a big mule deer last fall he didn't put it in cans because his family doesn't like canned meat. Instead he cut up and packaged the venison and placed it in cold storage right in his own kitchen. Result: The Goodins have fresh venison all winter long.

The Goodins' cold storage farm refrigerator is something decidedly new. Actually it is two refrigerators in one. Half the cabinet is the same as a regular household refrigerator. The other

Mr. Goodin places cartons of berries in his cold storage box

RURAL LOADBUILDI

half, however, is held at a temperature of about 6 to 10 deg. so that meats, berries and vegetables can be frozen and kept for future use.

The box has a capacity of 25 cu. ft. divided evenly between cold storage and regular refrigeration. A ⅓-hp. motor and compressor holds the box at the correct temperature. During August and September 80 and 72 kw.-hr. respectively were consumed.

Formerly the Goodins made use of cold storage lockers in a regular cold storage plant. This sold them on the freezing method of preservation. They find, however, that having the frozen foods in their kitchen is an advantage.

Electrical Youth

Young Oregon farmers study rural electrification

By L. E. FRANCIS
Asst. County Agent
Washington County, Ore.

Importance of any organization which teaches the coming generation of farmers all the advantages of rural electrification is obvious. Long before the youngsters own their own land their possible resistance to electrical farming will be broken down; and when they move in to farm for themselves the power companies can look for an increase in load.

Recent activities in Oregon are therefore encouraging and, to the utilities, thought-inspiring. There, rural electrification came to the front this year when Ed Setniker and John Santoro of Hillsboro, members of the Hazeldale Rural Electrification Club in Washington County, won the state championship in the agricultural demonstration division of the state fair with their demonstration on "The Operation and Use of a Magnetic Switch for Motor Control."

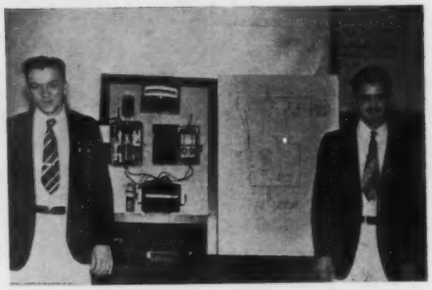
Setniker and Santoro explained in their exhibit the construction of a magnetic switch and the course of electricity through the switch. They also showed how the start and stop unit and the magnetic coil operate; how the overload feature of the magnetic switch furnishes a protection to the motor not provided for in a knife switch.

The Hazeldale club, one of two such clubs in the county, is made up of seven boys under the leadership of Setniker. Ben Faber, Portland General Electric Co. rural service agent, is instructor.

During 1937 the group studied farm power loads, how they are calculated according to the various types and amounts of electrical appliances used and the size wire required to carry the respective loads. Second phase of their instruction was devoted to the use, operation and maintenance of electric motors.

Field tours, on which the club members had an opportunity to study electric power as efficiently and economically applied, were held to leading farms.

This year the group is studying electric power on the farm and the factors involved in proper lighting.



Ed Setniker (left), John Santoro and the equipment they used in their demonstration

Sooey! Sooey! Sooey!

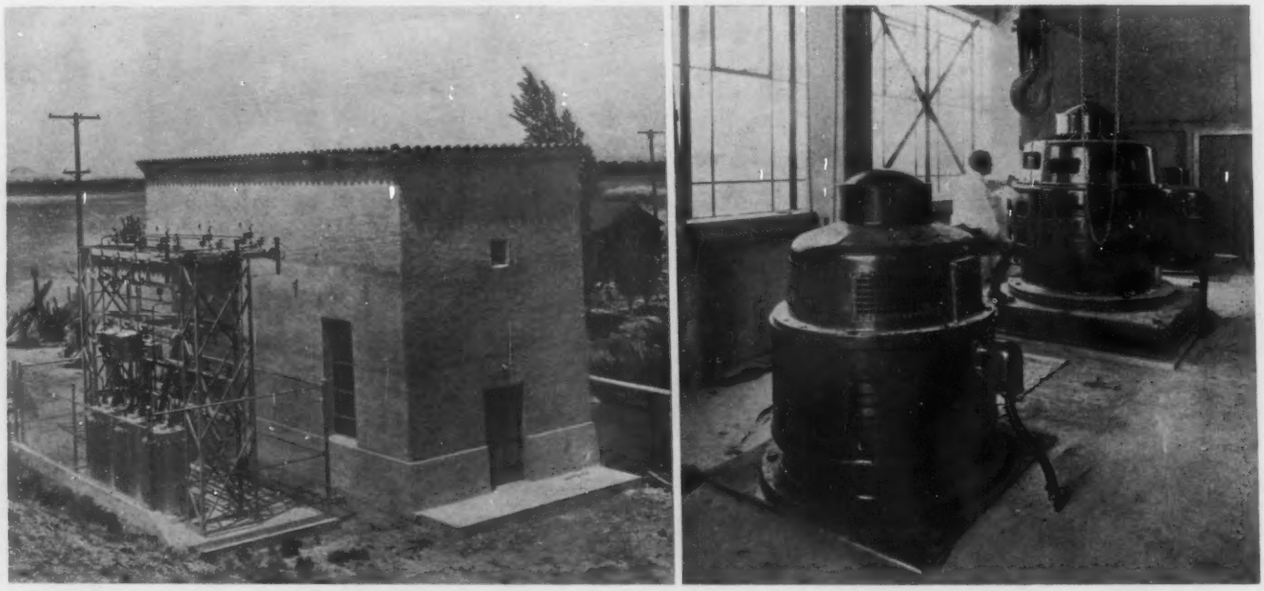
An Idaho hog breeder develops a way to heat whey

In developing a practical method of heating whey for his pigs, Earl Cox, Grace, Idaho, hog breeder, has opened up for electrical dealers a new market for the soil heater.

Mr. Cox brings whey for hog feed from a near-by cheese factory. He tried several methods of heating a 40-gal. tank of this delicacy, but encountered difficulties in a deposit which formed on the heating unit. Then he thought of soil heating cable.

Taking a 60-ft. length of this cable, which consumed 400 watts, he wrapped it around a wooden frame and immersed the unit in the whey. Now the tank is kept at 70 deg., the pigs are growing fat and the operation costs but $3 per month.

Irrigation and Flood Protection for the Sacramento Valley



Rural load is industrial load in many of the arid regions of the Far West and it demands the same kind of service and installations as industrial customers elsewhere. Here is a recently completed drainage pumping installation at Chandler, Calif., in the rich Sutter Basin of the Sacramento Valley. Built with PWA funds, it is a part of the Army Engineers' flood control service to that region. The plant lifts the occasional flood waters from one of a series of drainage canals back into the Sacramento River for irrigation use. Many of these plants are fully automatic, operating by means of float control switches which depend on water level

Air Conditioning

How a Riverside reverse cycle installation is working out

Possibilities of reversing the cycle of a refrigerating machine for heating are of obvious interest to engineers and utilities. As home-owners come to realize the desirability of having the year-round functions of air conditioning combined into one simple all-electric unit the power companies build up their load.

Keen, therefore, is the interest with which Western utilities' sales departments are watching the reverse cycle installation in the home of John J. Mangel, air conditioning engineer for Nevada-California Electric Corp., Riverside, Calif.

Mangel's house has two stories, nine rooms. The ceiling is insulated with 4 in. of glass wool, the walls with 2 in. suspended between inner and outer surfaces. Equipment is in a concrete basement which acts as a plenum for return and fresh air. Cubic footage of the house is 20,000. There are ten supply grilles; returns are through corridors and stair-well.

Control of the air conditioning plant, which has been operating for a year, is by day and night clock thermostat. This maintains the following conditions:

Winter day setting: dry bulb, 74 deg.; relative humidity, 35 per cent. Winter night setting: dry bulb, 60 deg. Summer day setting: dry bulb, 77 deg.; relative humidity, 50 per cent.

Design conditions for Riverside are: Summer—outside dry bulb, 100 deg., outside wet bulb, 73 deg.; inside dry bulb, 80 deg.; inside wet bulb, 65 deg. Winter—outside dry bulb, 30 deg.; inside dry bulb, 73 deg.

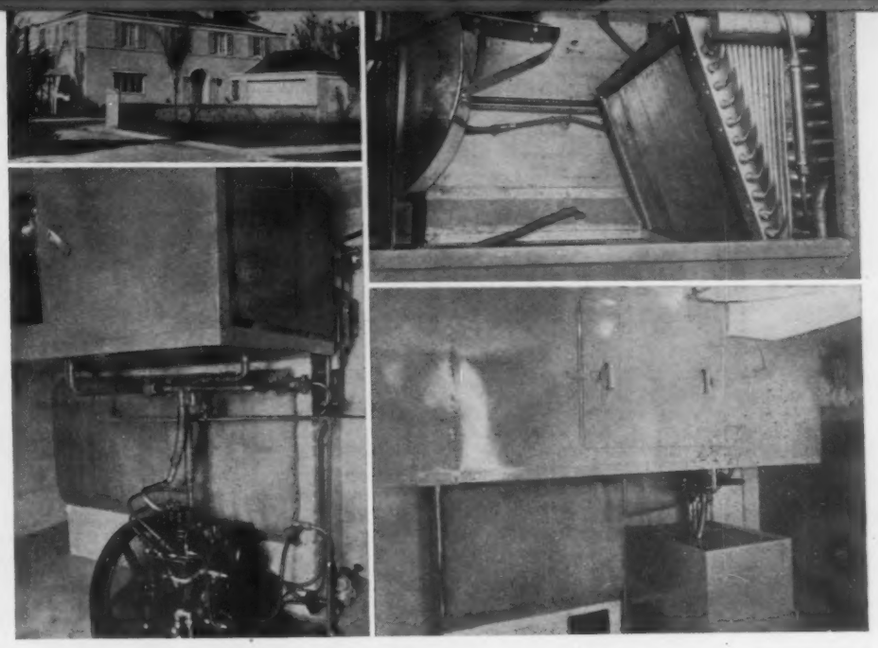
Heat gain for the house is calculated at 32,000 B.t.u.; heat loss, at 54,000 B.t.u.

Inasmuch as Riverside's summer temperatures reach 105 deg. for several days each year and winter temperatures hit a low of 26 deg., the following may be considered an average heating performance of the plant:

Outside dry bulb temperature	48°
Inside dry bulb temperature	74°
Air circulated	1850 c.f.m.
Air entering condenser coil	72°
Air leaving condenser coil	93°
Suction pressure	44 lb.
Head pressure	122 lb.
City water temperature	65°
City water consumption	180-200 g.p.h.
B.t.u. input to compressor motor	7600
B.t.u. output	40200
Coefficient of performance	5.3

Since the house is all-electric, being equipped with range, refrigerator, water heater, bathroom heaters, etc., the rate for air conditioning is entirely within the 1c block. With electricity costing 1c per kw.-hr. and water 7c per 100 cu. ft., operating costs run:

	Compressor and Fan	Condenser Water
April	$ .80	....
May	.95	....
June	1.10	.85
July	2.25	1.40
August	3.40	2.35
September	1.95	1.25
October	.75	....
November	2.85	2.20
December	4.95	3.57
January	5.67	3.90
February	6.00	4.20
March	4.80	3.10
Total	$35.47	$22.82



Size of Mangel home can be seen in upper left. Lower left: 2-hp. compressor unit, air filters above and control switches and meters at extreme right. Above right: inside the air chamber, showing blower at left, and special design double duty (refrigerant or water) fin coil condenser. Armored cable at center is for connecting an auxiliary electric heating grill, which has not been found necessary. Lower right: air conditioning plant housed in, located in sound proofed basement

Value: $100

A P. G. & E. skit builds interest in Red Seal wiring

"This meeting should prove to be worth at least $100 to every contractor who attended."

So said a contractor who attended one of the two Red Seal, adequate wiring meetings held by the San Jose division, Pacific Gas and Electric Co., in San Mateo and San Jose.

Just what feature of the meeting prompted the remark was never asserted. There were speeches by A. L. Perdue, commercial lighting salesman, on better store lighting; by A. W. Williford on Red Seal wiring, and by Emmet N. Britton, dealer sales promotion representative, on the benefits of the Red Seal plan. Chances were, however, that the remark was the result of the two skits, written and directed by Britton and acted out by W. L. Greer, L. T. Cronkite and C. L. Moorhead.

First skit showed how Bill Jones, electrical contractor, sold wiring before the "Red Seal boys spread the gospel." Second skit, giving all the sales arguments for adequate wiring, showed Bill after he had taken the gospel to heart.

Said he to Mr. Seal, who was building a new house: "I have just been looking over the wiring plan for your new house and it sure looks complete. You are to be complimented on insisting on a real job. . . . But there are a couple more outlets that you might put in which I believe would add to your enjoyment of all the conveniences that electricity has to offer you. For one thing I notice that one of the convenience outlets is located right where Mrs. Seal intends to place the davenport, which certainly would make it anything but a convenient outlet. Then, too, I saw that there was no provision for a radio outlet in the master bedroom. I know that your are figuring pretty close, but I feel sure that for the very small additional cost *now* the extra convenience will more than make the investment pay you big dividends. You see we can do the extra work before the house is finished for a small fraction of what it will cost after the house is finished, and I'm sure that after you have moved in you will wish that you had them."

Remainder of the skit carried on the argument—in the face of objections by the architect—until Mr. Seal was sold. And, more important, until the audience had learned—and, undoubtedly, remembered—how to meet and overcome any and every obstacle that might be thrown in the path of an adequate wiring job.

Q. E. D.

A machine shop ascertains the value of more ft.-candles

Many manufacturers, although expressing great pride in the lighting of their plants, never know exactly how important an item that lighting is to their production. Christie Machine Works, San Francisco, however, made an effort to find out.

Christie knew that the modern lighting of its new plant had, at boom times, converted the shop from an 8-hr. to a 24-hr. establishment. It knew, too, that the lighting accounted for a large part of the 33-per cent higher sustained production record made by the night shift over the day shift. But what did the workers feel about it?

Inquiry was made recently, about one year after the company moved into the plant, and it was found that every one of the men on the night turn had gained weight because during work they were at all times physically and mentally rested.

This factor is itself sufficient basis on which Westinghouse Electric & Mfg. Co., who engineered the installation, can sell similar industrial jobs. However, Westinghouse can also point to the installation alone.

To meet the problem of supplying enough light for fine machine work, exact blue print reading, etc., Westinghouse painted walls and ceiling a flat white and installed 21 high intensity units. Ten of these are H.I. Mercury-Mazda units, ten are straight H.I. Mercury units and one is a straight Mazda unit.

Each light has its own ballast transformer mounted directly above and is connected to the suspension conduit by a "safe-change" hanger which permits shifting to any place in the shop to correct stroboscopic effect. Result is an even distribution on all working surfaces of 21 ft. candles—and in the old Christie plant there had been only from 5 to 10.

●

Two views showing why Christie employees work better

Largest & Newest

Golden Gate Exposition buys 9,000 floodlights

Largest floodlight order in history—9,000 fixtures of various types and capacities—was awarded to General Electric Co. last month by the Golden Gate International Exposition. Value was approximately $170,000.

Included in the order were 2,300 of the new "fluorescent tubes" recently developed by G. E. for easy and efficient floodlighting, particularly in green, blue, pink and amber. Mounted in continuous reflectors with built-in transformer, condenser and choke-coil, these 18-in., 15-watt gas-filled tubes will operate on a 120-volt circuit.

This new element, not yet on the market, produces light by passing the ultraviolet rays from mercury vapor through the glass tube, which is coated with fluorescent mineral salts. It will be a mainstay of the exposition lighting scheme, and experience thus gained is expected to be valuable in widespread commercial application later.

The balance of the order covered 3,100 floodlights of 200 watts or under for general duty; 2,750 heavy style lights, mostly of 1,000 watts; 125 1,500-watt lights of a specially created 18-in. diameter type, and 275 lights ranging from 250 to 1,500 watts for underwater service.

The exposition also placed an order with Westinghouse for 1,200 aluminum deep bay reflectors of various sizes for the standard interior lighting of the main exhibit palaces. Seven hundred will be mounted along the arching girders supporting the roofs. They range from 750 watts near the walls to 1,500 watts in the center of the halls. The remaining 500 are 500-watt reflectors, equipped with deep straw glass or screens which will give the effect of synthetic sunshine, to throw light upwards. Value of the order was $10,000.

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IES Activities

President Henry B. Dates meets with Western groups

Speaking to lighting men on a tour of the far West, Prof. Henry B. Dates of the Case School of Applied Science, Cleveland, Ohio, and president of the Illuminating Engineering Society, brought a message of the work of the Society in the development of the recommended standards of minimum lighting for schools and of tests being made to prove conclusively the effectiveness of good lighting in scholarship. Prof. Dates addressed a large group in Los Angeles. In San Francisco his meeting conflicted with the Pacific Coast Electrical Assn. meeting and was not so large. In Portland, Seattle and Spokane he also met with lighting men. While in San Francisco discussions took place urging that the I.E.S. convention in 1939 be brought to San Francisco at

the time of the Golden Gate International Exposition.

"So Light and the Seven Twirps" was the intriguing title given to a clever presentation of lighting markets and opportunities presented before the Los Angeles Electric Club by the Illuminating Engineering Society, Southern California Chapter. Alston Rogers of Incandescent Lamp Department, General Electric Co., was commentator. George Rankin, manager of lighting sales, Southern California Edison Company, was chairman of the day, and honored guest was Prof. Henry B. Dates of the Case School of Applied Science, Cleveland, Ohio, and president of the I.E.S.

Making use of three screens across the wide expanse of the Biltmore Bowl, on one were projected slides of lighting installations, on the other projected light-meter intensities and on a large center screen, in silhouette, were shadows of the "Seven Twirps," the dwarfs of the Disney picture. Each "Twirp" represented one of the classifications of lighting. As Mr. Rogers spoke the dwarf figures were moved in such a way as to cast larger shadows to indicate the increased market in each of the divisions of lighting represented by the "Twirps."

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Ordinances

Spokane & Fresno pass new but different laws

Cities of Spokane, Wash., and Fresno, Calif., have adopted new electrical ordinances embodying the 1937 edition of the National Electrical Code with only a few local additions.

Fresno changed the 2-watts-per-sq.-ft. rule in article 210 to 3-watts-per-sq.-ft.; added the bathroom to the lists of rooms requiring appliance outlets; made mandatory the 10-ft. rule for wall spacing of outlets.

Spokane provided for an appeal board, to be appointed by the commissioner and to consist of an architect, electrical contractor, corporation counsel and others, to which citizens may take their grievances from the rulings. Use of BX or metal-lined cable is permitted under the ordinance; property owners will be allowed to do their own wiring without a bond but will be required to get a city permit.

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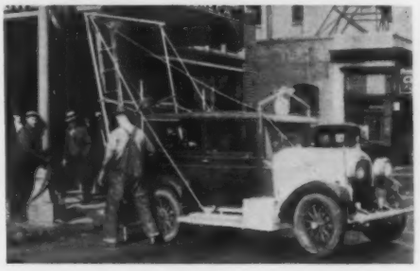
Shorts

Air conditioning salesmen now know exactly where they stand in respect to the water problem in Fresno since a new ordinance was passed April 7 setting forth definite water rates for air conditioning installations on domestic lines using water as a cooling medium. Fresno has no water meters; rather it bills on a flat rate basis. Hence the water rates are on a similar basis. The rate is $1 per month for a 5-month period for 1.5 gal. per minute at 20 lb. pressure, which will service a 1-ton job. On the same basis $2 serves a 2-ton job, $3 a 3-ton job per month. The average domestic installation is 2½ ton. This rate covers the sewage disposal of the water at the same time. Commercial installations have a limit of 6 ton which may be connected to the water mains and sewers. Over 6 ton cannot use the sewage system but must use cooling towers or evaporative condensers. Rates were derived after a study showing that the 9 to 10 a.m. peak of sewage was not affected by the air conditioning load which comes on from 2 to 5 p.m.



Ingenious rig for pulling wire or cable in street-lighting installations has been developed by Globe Electric Works, San Francisco, from an old automobile. A frame made of conduit over the back of the car provides a derrick to which is attached an automobile wheel for a pulley. Power for a winch at the rear of the car is provided by tapping the differential. Pulling tape is wound on this winch, drum of which is made from a large brake drum. When the tape is fully wound it can be slid off, completely coiled and again ready for use

TO BE LAUNCHED May 10 at a "Kick-Off Dinner" is Seattle's adequate wiring program as sponsored by the Electric Club of Washington. A modification of the national program, the campaign will be handled by an executive committee appointed by Club President Ray Muffley and consisting of J. J. Agutter, chairman, William Flood, James Kelly, Tom Widrig, William Gaunt and Van S. McKinney. Members of this committee will act as chairmen of the subcommittees which will handle the various phases of the campaign.

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ACCEPTED AND MADE EFFECTIVE last month by San Francisco contractors was a bid depository plan drawn up by the San Francisco Electrical Contractors' Assn. and the Master Electricians' Club. Under the plan, a depository is established at A. E. Rowe & Co., 660 Mission St., to which bids must be delivered either by messenger or by mail (provided, in this case, that the letter is post-marked 2 hr. prior to submitting the bid to the awarding authority or 26 hr. prior to submitting it to a general contractor). Duplicate bids are not opened until 24 hr. after bid-opening time. The Fair Trade Practice Rules incorporated in the plan apply only to competitive work in amounts of $100 or more in the city and county of San Francisco. Jobs must also be registered with A. E. Rowe & Co.

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APPRENTICESHIP PROGRAM for electrical wiremen has been set up in San Francisco through the cooperation of the San Francisco Electrical Contractors' Assn., Local No. 6 of the IBEW and the public schools. Classes are held two nights a week.

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SEPARATE BELL-RINGING TRANSFORMERS for each apartment in multiple-occupancy buildings have been recommended by Ralph W. Wiley, chief of the San Francisco Dept. of Electricity.

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CALIFORNIA'S RED SEAL plan will be incorporated into the National Adequate Wiring promotion done by Pacific Coast Electrical Assn. members. This recommendation was made and approved at the association conclave in Fresno.

●

FORTY-FIVE ELECTRICAL INSPECTORS from Colorado, Wyoming, New Mexico and South Dakota attended the fifth annual inspectors' school of the Rocky Mountain Chapter, IAEI, in Denver late in March.

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NET PRICE CALCULATOR to help the trade quickly and accurately to calculate wiring device net prices on regular wholesale discounts is being distributed by Bryant Electric Co.

●

DRIVE TO ELIMINATE radio interference in Salt Lake City and other Utah towns has been started by Utah Power & Light Co. representatives and local radio dealers. According to a survey made by the campaigners, 99 per cent of household appliances require filters.

●

SCHEDULED FOR COMPLETION late this month is the installation on the fifteenth and sixteenth floors of the new Canadian National Hotel, Vancouver, B. C., of what is said to be the largest air-conditioning job in Canada; by Jarvis Electric & Refrigeration Co., Vancouver.

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MODERNIZATION OF LIGHTING equipment in Vancouver, B. C., retail stores and show windows is the major objective of a campaign launched by the Retail Merchants' Bureau of the Board of Trade.

EDITORIAL

Latent Asset

GIVE us the facts so that we may help build friends for the industry. This, in effect, is the gist of a letter from one of the rank and file workers published elsewhere in this issue. This worker expresses a desire which is latent in the hearts of every man and woman in the industry. He poses a problem that is difficult to solve, but one which must be solved if business and industry are to preserve the principles which have built the economic and social structure of this country. The men and women who comprise the electrical industry are its greatest asset. Instilled with confidence and armed with facts they are a latent source of strength. It is up to the brains of the industry to devise ways and means to use them.

Popular Preference

THERE is more than just a ray of hope for the future in the outcome of the utility district election in Oregon last month. Defeat of this measure demonstrates as fact something that up to now has mainly been a hope, namely, that the public temper is changing as regards political promises of "cheap" power. As Franklin T. Griffith, president of Portland General Electric Co. whose territory was vitally affected by the election, puts it, the vote was indicative "of popular preference for the continuance of private ownership and operation of electric utilities under public regulation."

The seven-county district plan was one of the largest undertakings of its kind ever proposed in the West. It was a real test of public sentiment in a region that long has benefited from average rates which were among the lowest in the U. S. The impressive defeat of the proposal must be a severe blow to proponents of government ownership.

Of even more importance is the fact that this test of popular preference should usher in an era of genuine cooperative effort between the Bonneville Administration and the private companies of the Northwest for the utilization of Bonneville power for the greatest possible public benefit. Bonneville is a great source of low-cost generation because such a large proportion of the initial cost can be applied to navigation improvement. The Oregon Public Service Commission has already announced its intention to see that such savings as the project carries with it will be passed on to the customers of the private companies. The Bonneville Administrator also has some jurisdiction over the resale rates. Under a cooperative program the project can be operated for the ultimate benefit of the entire region. Certainly such a program will have the backing of the whole electrical industry.

Not Credit But Confidence

WASHINGTON reports indicate that efforts are to be made to stimulate a billion-dollar private utility spending program with RFC loans. Theory is that funds for such a program are lacking, that only in this fashion can credit be provided. There is far more to the revival of utility expenditures and expansion than the simple matter of credit. The trouble is deeper rooted than that.

Modern business is built on faith and confidence. Public faith in the future of the utilities, and the confidence of the utility people themselves have been threatened by a Federal power policy that lacks definition, stability, purpose and clarity. The government's power policy has encouraged dissatisfaction and suspicion. There has been a deliberate effort in some government quarters to spread and popularize malicious doctrines. Utility managements have been forced to spend more time protecting their property against attack and seizure than they have at operating their businesses efficiently. They have been harassed by regulations, demands for reports and threats of investigation. Increased tax burdens and subsidized competition have affected earnings so adversely that credit has been impaired in many instances.

Under such conditions voluntary expansion of utility expenditures would be not only foolhardy but virtually impossible. Until these threats are removed, the feeble palliative of RFC loans is not likely to stimulate anything.

If the administration sincerely wants the electric utilities to assume the position of leadership in recovery which they can, let it clarify its power policy. Let it assure the utilities that there will be no more TVA's financed with the pump-priming funds. Let it give assurance that none of this money will be used to promote subsidized competitive municipal systems on a 45 per cent grant, 55 per cent loan basis. Let it ask the utilities for only their fair share of taxes without placing discriminatory tax loads on them. Let its attitude toward the utilities be cooperative rather than punitive.

With these assurances, it will not be necessary for any RFC loans. The utility recovery mechanism would function under its own power.

ELECTRICAL WEST

DEVOTED TO THE ECONOMIC PRODUCTION, TRANSMISSION AND DISTRIBUTION OF ELECTRIC POWER AND ITS APPLICATION TO INDUSTRY, COMMERCE, AGRICULTURE AND HOME IN THE PACIFIC EMPIRE, AND TO THE MARKETING OF EQUIPMENT AND APPLIANCES AND OTHER UTILIZATION DEVICES IN THAT AREA

San Francisco's Dilemma

ON FIVE different occasions voters of San Francisco have rejected proposals for municipal distribution of Hetch Hetchy power. For 13 years the city has derived from this power an average annual income in excess of $2,000,000, which has been applied to the water bond carrying charges with a resultant decrease in its tax rate. Now the Federal District Court says, in effect, that disposal of the power in any other manner than via municipal distribution is a violation of the 1913 Congressional grant which enabled the city to utilize government lands in developing its water supply system.

Without arguing the validity of the court's findings (which undoubtedly will go to the U. S. Supreme Court for final adjudication) one might justifiably question the motive which brought on the injunction suit. Basically the suit is but another evidence of the new deal policy of federal encouragement of municipal ownership. Apparently it matters not that the federal government has no valid interest in the power or that it is uninjured by the contract which has been in effect since 1925; it is of no importance that the people of the city are not disposed to municipal ownership; that other government-generated power is distributed through private utilities; that the Raker Act is out-dated or that enforcement of the injunction would be uneconomic or wasteful. San Francisco must submit to bureaucratic dictation or move to amend the Raker Act. The latter is the wisest course.

Telling the Tax Story

TAXES can eat the heart out of any business. The tax load now carried by the utilities should be of material concern to every individual connected with the industry, whether he be employee, stockholder or consumer. Higher taxes are a threat to the earnings of the employee; they jeopardize the income of the stockholder and they preclude lower rates to the consumer. Until each of these groups appreciates the direct effect of this tax burden on their pocketbooks, there can be no concerted movement for relief.

Only by putting the tax story into a form readily understandable can this be accomplished. For instance in the case of one Western utility the 1937 tax bill amounted to $1500 for every employee or 80 cents for each dollar of wages. The employee will appreciate what that means to him. Of every dollar this company received from its customers, the tax collector took 16 cents. Total taxes paid averaged $16 per customer. And taxes increased 12 per cent for the year. The customer can understand how this affects the possibility of reducing rates. From the standpoint of the stockholder, taxes exceeded dividend requirements. Total taxes paid in the past 20 years were greater than the funded debt outstanding at the end of 1937. As trustee for the stockholders, with added responsibility for maintaining the economic lot of labor and at the same time keeping prices to the consumer low, management must somehow cope with this increasing tax load. To keep the burden from becoming oppressive to the point of destruction, is going to require united action.

Motion Instead of Emotion

THE entertainment committee for an Elks picnic has its troubles, but on the whole, an easy time of it. Everyone is out for a good time and is easily satisfied. Business during good times is very much the same. It takes skill to run it, certainly, but everyone is tolerant of mistakes as long as the general run is forward.

It is in times like now that neither an Elks picnic nor the usual management technique suffices. Management, whether of sales only or of the entire business, has two jobs on its hands—first, to unsell the panic, the fear that recessionary trends give rise to; and second, to run the works. The best antidote for fear has always been concentration upon the work itself. And now it is the only antidote for today's difficulties too.

Rather than waste energy, emotional and physical, in fear and worry, this is the time to turn on the ingenuity, to examine product or service, to work out ways in which the same or better service or product can be offered in an improved or more economical way and thus tap a wider market. Just as industrial production studies time and motion to improve methods, sales motion and action can be analysed and improved. Personnel efficiency can be heightened. Interdepartmental functions can be smoothed and unnecessary lost motion reduced. No matter how efficient an organization has been there is plenty of room for improvement if the mind is directed to this task and the shackles of habit, tradition, and laziness are thrown off.

Thus engaged the salesmen or the personnel will be headed forward instead of trembling on the verge of retreat. There will be no room in a busy mind for panic or fear.

PCEA Conclave

What was done—What was said—Significant comments by experts—What is planned

Ataraxy, the antidote for jitters, was the Greek word for it. So wiry and witty Dr. F. P. Woellner of the University of California at Los Angeles described it. Hippocrates, father of medicine, believed that for every ailment there was a counteracting specific. "Taraxy" was the Greek word for "jitters" and "ataraxy" would be its soothing antidote. For present day jitters Professor Woellner directed the final PCEA conclave meeting to remember that things had been bad before, that the only sure thing was change, that men's laws might be broken but that the fundamental laws of nature broke men who did not learn to live at peace with them. There were WPA projects in Egypt—"what do you suppose the pyramids were but a big public futility?" Democracy, he assured his responsive, laughing audience, will survive because it rests upon a broad base. Dictatorships are like pyramids trying to stand on their vertices.

A kind of ataraxy itself was this Fresno conclave, attended by 300 and presided over by President R. M. Alvord, General Electric Co. How well it served its purpose may be judged from the skeleton report of committee accomplishment, speeches and plans for continuation of work reported below. The PCEA, it will be remembered, initiates committees only upon specific demand for a study of or program on some subject. Fresno's meeting was held so that members might (1) hear what the committees so appointed in the Business Develepoment, Operating Economics and Administrative Services sections had accomplished, (2) wind up the year's work.

What Was Done

BUSINESS DEVELOPMENT SECTION—Henry C. Rice, chairman:

Compilation of all known available books, pamphlets and data on commercial and industrial lighting—earmarking those of most practical value—and analysis of school lighting problems have been made by the lighting committee, chairmaned by Rod Doerr. He recommended: doing the same with home lighting data next year; purchase of photoelectric demonstration kit for use by member companies. At his committee meetings Frank Hansen spoke on available lighting tools; G. M. Rankin, on the status of school lighting and educator response to it; M. H. Jankelson, on the status of home lighting and developments in the art. Ralph Wiley warned the industry that it would not get adequate wiring by promoting cheap methods, but only by selling more ample service entrance facilities; Harold Gerber told of National Electrical Code changes affecting lighting; Leo Gianini outlined what special lighting training would be good for the industry.

Adequate wiring had a big inning in the Red Seal committee. The relationship of the National Adequate Wiring Program to the veteran Red Seal program in California was discussed. Chairman Carl Heise announced that the two would work together, that the Red Seal standards have been revised upward, now including a water heater circuit, and that the uniform ordinance sponsored by the Pacific Coast Electrical Bureau had been brought up to date.

J. P. McElroy reported for the agricultural electrification committee, whose two projects —education of salesmen, and revision of the handbook—will be carried over. He asked for material to include in the revised handbook, engineering data, pictures, experience material.

Diesel engine competition impending, plus other power sales problems, George N. Hawley, chairman of the industrial power committee, reported, convinced power men that they still have a selling job, that "by God you've got to get more business." Data sheets and the power handbook will also be brought up to date. W. B. Cheney reported on the recent Western Metals Congress; J. H. Gumz, on new industrial heating developments: E. J. Cipperly, on power business possibilities; J. A. Corlett, on the data sheets; H. D. Easterbrook, on cooperation with maintenance engineers. Diesel engines were discussed by A. L. Laws; selling of power as a sales job, by E. W. Nilsson.

ATARAXY
"The Greeks had a word for it"—Dr. F. P. Woellner

Air conditioning committeemen, chairmanned by H. H. Douglas, heard Dr. B. F. Raber and Dr. L. M. Boelter of U. C. outline the test procedure they will follow with cooling towers. Tests are being sponsored jointly by air conditioning societies and heating and plumbing engineers. Water and sewage disposal problems were discussed by G. C. Zelhart; wet bulb temperature studies, by J. A. Hill; reverse-cycle all-year air conditioning, by all members. Accomplishment this year has been a climatological survey of California, which has the greatest extremes of climate and conditions of any state, all of which affect air conditioning design. Further study, including Arizona, is recommended for next year.

Sales training for dealer salesmen, the committee headed by Frank Easton found, requires more information from dealers and utilities before it can be recommended or a broad program undertaken. Surveys of utilities have been made, surveys of manufacturers are partly completed and surveys of dealers will be made soon. The conference teaching technique available through the state board of education under the George Deen Act was discussed thoroughly and will be employed by several companies. Other sales training procedures will be appraised and recommended.

OPERATING ECONOMICS SECTION—D. D. Smalley, chairman:

A new language, a new line of thought, said Fred George, has been found necessary by engineers seeking to handle the human problem of occupational segregation and classification and that of setting up means for promotions and improvement. Labor legislation had found the companies unequipped to deal with the subject to the best advantage of both employee and management. A more labor-minded industry needs the same kind of engineering analysis and data to work with as other activities.

When Section Chairman Smalley reported for H. H. Shields on the problem of grounding equipment on poles, he admitted it to be a controversial subject. In committee meetings, the hazard to linemen from grounded transformer cases had the opposition of most men. Possible interconnection of service neutrals with all grounded equipment on rural lines was recommended. J. Vivian led a discussion of relay, fuse and arrestor protective methods on existing systems. The Larsen method of resuscitation was demonstrated and discussed by Howard Miller.

C. F. Gilcrest, chairman of the economics of demand metering committee reported that data were still being collected, so conclusions had not yet been drawn. R. C. Powell, in charge of the study of "topping turbines," explained that his committee investigated the economics of steam plants built jointly with industrial customers such as the P. G. & E. steam plants at oil refineries where process steam was an important factor. The problem, he said, is more commercial than operating, yet it requires engineering study so that sales departments can be aided. G. E. Decker gave a paper on drop-forged impulse wheel buckets.

New rubber non-leaded cables for low cost underground distribution has possibilities, reported Homer Keesling. Seven years' experience in underground was rounded up in committee meetings. Costs have been brought down from 5 times to from 2½ to 2 times the cost of overhead distribution. More potential decreases may be possible in accessory equipment.

Power factor correction and voltage regulation produce some interestnig paradoxes, reported Parker for H. H. Minor, chairman of the committee. These are: "Two distribution circuits are usually cheaper than one," and "capacitors used for distribution system improvement cost nothing." Meter men, led in discussion by R. Crowell, are interested in standardization, appear to favor 15-amp. meters for single phase applications with combination 2-wire and 3-wire meters available.

ADMINISTRATIVE SERVICES SECTION—H. C. Ross, chairman:

Public relations audits have been conducted by many companies. Their methods and results have been compiled by Alfred May's committee, G. H. P. Dellman reported. and will be mimeographed for distribution.

Study of credit systems employed by various companies revealed little uniformity, small hope of any more, R. N. Dreiman's committee reported through Leonard Rauch. A continued study was advocated. One suggestion—to present customers in good standing with a credit card when they move to another utility's territory—is being studied with interest.

Finishing a work begun last year, W. S. Fleming's committee on appliance servicing

policy has prepared a digest of discrepancies in the range and water heater servicing practices of various utilities. R. E. Smith's committee on employee information made no report although it did complete a survey.

What Was Said—Significant Comments

R. M. Alvord—"These meetings are held so that we may give and receive ideas. . . . The association is a service agency in which we meet to discuss and solve the problems of the industry. . . . It invites every branch of the industry to submit its problems to the association so that we may work together on their solution."

E. G. Stahl, reporting on the Edison Electric Institute's Chicago meeting of commercial men and on his trip through TVA territory—"There is a tendency toward selective selling., for net profit value rather than kw.-hr. and gross; more study of the costs to serve various types of load. . . . Controlled off-peak water heating, especially by carrier current control interests many, especially because of savings in investment, greater flexibility. . . . Lighting celebrates the fifth year of Better Light-Better Sight with 6,000,000 IES lamps sold. Predictions of 1000 ft.-candle intensity were made. General Motors recently installed 700 ft.-candles for car displays. . . .

"The National Adequate Wiring Program is on its way . . . a long tough job . . . flexible, to meet local requirements. . . . Other campaigns on appliances are dependent on its success. . . . The basic selling job requires manpower, and utilities must prepare to put it in the field. . . . Rural electrification is split into two camps, those who are in conflict with REA and those who cooperate. . . . The farmer co-ops have laws to give them right-of-way in many states . . . but all is not rosy among them. . . . Arkansas Power & Light is the best example of cooperation . . . builds lines at $640 per mile, with farmer labor at 20 and 25 cents per hr., paid to contractors for wiring the house, at $14 per house. . . . Unusual methods are necessary since average use is only 40 kw.hr. per month. . . . Power sales now need defensive tactics . . . harder to sell preventative medicine. . . . General Motors diesels will be sold chiefly to busses and trucks . . . other motor makers may follow suit . . . competition will be clean but keen because they are effective merchandisers."

Of TVA—"Objectives: flood control, navigation, defense and incidentally, power. Flood control theory of Harcourt Morgan is to produce phosphate fertilizer, raise cover crops like clover to capture nitrogen from air, convert this into more fertilizer. Navigation so far has only barged materials to the construction jobs. Defense equipment is only that of a nitrate plant at Muscle Shoals. Power is the real objective. Methods of fostering municipal elections make any municipal contests out West tame comparison. TVA directors quarrel is thought to revolve around (1) sale of power to private industry, (2) purchase of phosphate deposits, (3) an agreement between H. A. Morgan and Lillienthal on purchase of Senator Berry's marble deposits, (4) friends and relatives profiting from submerged land deals."

Clotilde Grunsky, Pacific Coast editor, *Electrical Merchandising*, speaking at the Business Development Section meeting of her trip to England and of the small individual water heaters in use there—"Do we have too high-hat an attitude toward electrical appliances? Might we not start on the ground floor too? . . . Women are natural born bargainers, have learned to accept the one-price policy because of its assurance of quality. But with wild trade-in offers women revert to bargaining. . . . Women ask each other's advice. It is important to keep women's good opinion, to cultivate the natural leaders of the community. . . . It is a mistake to cut off home service girls in hard times. . . . Small appliances need a cabinet to make them more convenient to use. . . . More needs to be done to make store salespeople conscious of lighting and good lamps. . . . Keep in touch with women's magazines: there are styles in home equipment as well as clothes. . . . How many of the thousands of women who write to women's magazine editors for advice asked for it at the utility and were not given sound information?"

Willis M. Kenealy, regional supervisor, California State Board of Education—"While we are sitting here there be 128 commercial failures; four will close their doors in the next 20 min. . . . Autopsies reveal ignorance of business principles, lack of capital, poor management . . . inexperienced people behind an expensive machine. . . . Education is most important to man on the job . . . two types available under George Deen Act—informational classes and conference groups. Conferences are not classes but are directed discussion to the end that each person benefits by the experience of all present . . . small groups . . . not aimless discussion, nor a debate, but conferring under leadership. . . . Classes define and state the problem, contribute all pertinent facts from total experience, evaluate and discard, help student make a tentative solution and apply it in his own business. . . . They teach clear thinking."

Elliott C. Hensel, sales counsellor—"Sales management is today's important sales technique. . . . Surveys reveal most salesmen make too few calls and quit. . . . 60 per cent of sales are made after the fifth call. . . . Reason they quit is because they depend entirely on personality, have nothing new to say to a prospect after one or two calls. . . . Sales management realizes value of pre-approach — preparation for selling by investigating customer's needs. . . . Business makes a mistake in hiring too many kids . . . older salesmen, well directed, produce more because of stability, conscientiousness, open mindedness to criticism, judgment, experience, less desire to quit, more cooperation, less likelihood to 'yes' the boss. . . . Sales managers must challenge men, help them and reward them."

Section chairmen—H. C. Ross: "Our work in the study of these administrative problems is not through, never will be." H. C. Rice: "Fifty-nine years ago Edison carried all the lamp globes in the world in a market basket. . . . The public today has more necessities and luxuries than it did then—many of these compete with electrical needs. Industry is 85 per cent electrified, the home only 5 per cent." D. D. Smalley: "Storms in recent weeks put several power houses completely out of commission, yet there was no serious interruption of service . . . proves the value of interconnection . . . a tribute to engineering."

PCEA Convention

Set for San Francisco May 26-27 —Modern school lighting—Adequate wiring—Electricity in medicine will feature program

Terminating a year of highly successful and productive committee activity, the annual convention of the Pacific Coast Electrical Association will be held at the Fairmont Hotel, San Francisco, May 26 and 27. From the 9 a.m. opening on Friday when President R. M. Alvord gives his presidential address until the banquet Friday evening, there will be a program replete with useable information and interest.

Stanley Scarfe of the General Electric Co., general convention chairman, has announced a program consisting largely of actual demonstrations or dramatic skits. Highlights include the following:

Visual demonstration and presentation on the importance of electricity in modern medical practice by Dr. L. H. Garland, San Francisco physician.

Demonstration of the latest technique in school room lighting by Dr. R. S. French, president of the California School for the Blind.

Wiring adequacy presentation by Frank J. Airey, F. J. Airey Co., Los Angeles.

Merchandise and markets, showing opportunities for greater use of electrical appliances presented by the Business Development Section.

Operating Economics Section presentation showing how utilities function under stress of storms and disasters.

Among speakers will be Earl N. Peak, president of the National Electrical Contractors Association and Dr. Paul Cadman. Features of the Golden Gate International Exposition will be described at a luncheon Thursday. Entertainment will include the annual banquet and a golf tournament. Provision has been made for entertaining the ladies.

Special convention rates will apply on railways and reservations are to be made with G. A. Campbell, Southern California Edison Co., Los Angeles, chairman of the transportation committee. Hotel reservations are to be direct with the Fairmont.

Preparations for the convention are in the hands of committees under the direction of the following chairmen: Al C. Joy, P.G. & E., publicity; Kenneth Ryals, Stone-Ryals Electric Co., greeting; W. P. L'Hommedieu, Westinghouse Electric & Mfg. Co., banquet; J. E. Crilley, General Cable Co., golf; I. W. Borda, Okonite Co., registration; H. Q. Noack, Hubbard & Co., ladies' entertainment; Mrs. A. G. Jones, hostess; B. W. Reynolds, program manager.

Feature of the convention will be a special meeting Thursday night at which architects, builders, school department officials and teachers will be invited for a special showing of the school lighting, adequate wiring and electricity in medicine demonstrations. This is being sponsored by the S. F. Electrical Development League with Allen G. Jones of the General Electric Co. as chairman of the committee in charge.

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NORTHWEST ACCOUNTANTS will meet in Spokane May 13-14 for the thirteenth annual meeting of the Accounting & Business Practice Section, Northwest Electric Light & Power Assn.

Program, announced by C. E. Gieseker, section chairman, will include explanation of Washington Water Power Co.'s improved methods of handling customers' contracts, orders, credits and collections; application of tabulating machines to general accounting, customer accounting and payroll; discussion of new problems involved in the classification of accounts.

Scheduled to speak are J. E. E. Royer, vice-president and general manager, Washington Water Power Co.; W. C. Mainwaring, general sales manager, B. C. Electric Railway Co., and association president, and Eric A. Johnston, director of the U. S. Chamber of Commerce.

Contractors

Labor Policy, sales tax interpretation, state inspection, adequate wiring—

Contractors of northern California converged from distant and scattered communities last month to spend a day discussing problems of pressing interest at Asilomar, near Pacific Grove, Calif. J. D. O'Connor, Lupen & Hawley, Sacramento, president of the northern California association, ran the meeting to a well-timed conclusion. Accomplishments of the day included:

Labor relations—Clyde L. Chamblin, appointee from district 9 to the national labor committee of the NECA, presented an outline of his thinking, asked for advice. He recommended a national policy of mutual responsibility between the union and contractors affecting working conditions, aprenticeship and relation of wage scale to market conditions. Local agreements would be made upon a basis of this policy. Contractors protested at the domination of many union locals by civil service employee members who influence wage rates of electricians working on day and hour rates. (Chamblin left for the national meeting in Chicago soon after this convention. On his return he said that many of the ideas he took with him will be embodied in the policy drafted there.)

A review of conditions in each locality represented at the meeting was given by a poll of the attendance. Covered were bid depository, wage, hour, union or non union, association, etc.

After many conferences with sales tax executives, President O'Connor was able to report a compromise acceptable to the State Board of Equalization. A committee headed by Lloyd Flatland presented a resolution that contractors accept and ask for this new basis. On lump sum contracts, where the selling price of a contract has given rise to much misunderstanding, the board is asked to accept the cost of materials as the basis on which to compute sales tax. On all other work the selling price will continue to be used. A second resolution was passed favoring the sales tax as an equitable tax measure condemning efforts to have it repealed.

Whether existing agencies such as state contractors' license board, state industrial accident commission, county ordinances and city departments could be coordinated and their activities extended to meet the demand for electrical inspection in unincorporated rural areas, or whether a state inspection system was desirable was discussed under the leadership of George Kimball, Industrial Accident Commission. The executive committee was directed to study the problem further.

What the fourteen causes for revocation of state contractors license mean and how they are enforced was outlined by Ralph Bowdle, deputy inspector for the license board. Questions were answered on points of interpretation. Since the new pre-qualification rules, one out of every four applicants for contractors license is disqualified or never takes the test.

Publicity material available through the new National Adequate Wiring Program was descrived by Secretary-Treasurer W. A. Cyr, and Arthur Kempston, National Electric Products Co., told how contractors can sell more wiring. He advocated that contractors read the adequate wiring material, sell their employees on it and talk it at every opportunity. The power of repeated suggestion from all sources and by everyone in the industry is the only thing that will finally make the public conscious of its everyday need for more wiring.

Left to the executive committee was the extent of participation by the association in the national program, as well as the selection of date and place for the next meeting.

NEWS OF THE INDUSTRY

SAN FRANCISCO LOSES HETCH HETCHY POWER SUIT

San Francisco last month lost the first round of its fight to continue distribution of Hetch Hetchy power through Pacific Gas and Electric Co. when Federal Judge Michael J. Roche ruled the city's 13-year-old contract with the utility is a violation of the Raker Act.

The contract, Judge Roche ruled, is one of outright sale for resale and not, as the city contended, one of agency. Since the Raker Act's prohibition against sale of power to private corporations is a valid exercise of the government's sovereign power, the government has every right to demand termination of the contract.

To this end the judge announced he would issue an injunction forbidding the city to continue its present distribution of power on about May 10, but would delay the effective date of the injunction for six months thereafter.

Thus faced with the loss of $2,200,000 in annual revenues, the city immediately began to lay plans to meet the situation. What was the best way out, however, remained a problem.

Plans were made to appeal to the Federal Ninth Circuit Court of Appeals within ten days after issuance of the injunction. Mayor Rossi announced that "if worst comes to worst the city should ask Congress to amend the Raker enabling act to permit the continuance of the present disposal agreement." In spite of the fact that voters have repeatedly defeated power bond issues, the city board of supervisors studied several proposals to issue the necessary purchase bonds.

SNOW PACK, PRECIPITATION SET CALIFORNIA RECORDS

California's snow pack this year was the greatest measured since the beginning of the co-operative snow survey program in 1930. The pack in general ranged from 20 to 60 per cent above normal and was from 10 to 40 per cent above last year's pack in all watersheds except the Kaweah. Precipitation figures were also far above normal.

Based on the results of these measurements, forecasts of run-off from the snow pack of most of the major streams of the Sierra have been made for the four months, April to July. The two extremes are the Kern River near Bakersfield, which will have a flow 192 per cent of normal, and the South Fork, Pit River near Likely, 105 per cent.

BIDS FOR CONSTRUCTION of Shasta Dam and power plant will be opened at Sacramento June 1. By the time the proposals are received, construction of the diversion tunnel and temporary railroad relocation are expected to be under way. Bidders will be required to furnish guarantee in the sum of $2,000,000. Amount of the performance bond will be $5,000,000, while a $2,500,000 payment bond will also be required. Completion time of 2,000 calendar days will be allowed.

U. S. SEEKS TO INTERVENE IN PLATTE RIVER FIGHT

Claiming that the U. S. owns all unappropriated water in the North Platte River free of control by the states through which it flows, Attorney-General H. S. Cummings last month asked the Supreme Court's permission to intervene in the pending suit brought by the State of Nebraska against Wyoming and Colorado for the apportionment of water in that stream. If the intervention is allowed, it is anticipated that all the arid states will eventually become involved in the case since the legal basis for Commings' claim is also applicable to streams in other states.

Cummings' argument is that territorial cessations to the U. S. by France, Spain, etc., vested in the federal government ownership of all lands and waters —or, more accurately, the use of all waters — excepting those in private ownership at the time of transfer. In granting water rights to private appropriators, therefore, the states have been disposing of federal property with the acquiescence of Congress, and the resulting private rights have derived not from the state making the grant but from the U. S. Federal compliance with state laws in carrying out reclamation projects has been a matter of comity, not of necessity.

GRANTED LAST MONTH by the Federal Power Commission was Portland General Electric Co.'s application for the merger of five of its wholly-owned subsidiaries, Yamhill Electric Co., Mollala Electric Co., Electric Supplies & Contracting Co., Electric Appliance & Construction Co. and Clackamas Power & Irrigation Co. In consummating the merger, these subsidiaries are to transfer all their assets to PGE, which is to assume all their liabilities and cancel all their capital stock. Book value of PGE's plant will thus be increased from $56,656,884 to $58,039,405.

PUBLIC OWNERSHIP DEFEATED IN OREGON

Public ownership of power distribution facilities was decisively defeated in Oregon last month when voters in the proposed Seven-County Public Utility District ballotted 13,537 for the district, 21,524 against.

Four small towns out of the 46 embraced in the district and four out of the nine separate rural parcels in the seven counties voted in favor of establishing the district by extremely narrow margins. Majority by which these towns and rural areas returned favorable votes on the measure were: In the towns—Barlow, 2; Lafayette, 18; Monmouth. 63; Falls City, 80. In the rural areas — Columbia County, 50; Nehalem Valley (Clatsop County), 26; Yamhill County, 172; Polk County, 129.

Closeness of the vote leaves the exact status of these towns and areas somewhat in doubt. The state hydroelectric commission, which has the power to declare the approved parcels of any district inoperable when the entire district returns a negative vote, has asked the attorney-general of the state for an opinion. Informal legal opinion elsewhere considers the seven-county district, or any part of it, dead without additional elections.

Despite this general defeat of the public power movement, however, campaigns for special elections are simmering in several other Oregon counties.

PACIFIC P. & L. PETITIONS COURT TO REVIEW FPC ORDER

U. S. Circuit Court of Appeals received its first petition for review of a Federal Power Commission order March 28 when Pacific Power & Light Co. appealed to the San Francisco court to overturn the order denying it the authority to absorb and disband the Inland Power & Light Co.

The merger, approved by the States of Oregon and Washington, was turned down by the FPC on the grounds that the "book value of the company is already seriously inflated" and would be lifted further under the plan and that the merger would not result in lower rates or better service.

ROOSEVELT ADMINISTRATION announced last month that it means to include RFC loans to public utilities in the new spend-and-lend recovery program. Just what companies would receive the loans was not indicated.

Inspectors Study Varied National Code Details

SOUTHERN CALIFORNIA CHAPTER, Southwestern Section, met at Glendale for its last bimonthly. Chairman A. H. Kay, of Anaheim, presided. Things done and topics covered in the all-day session included: Herbert Ufer of Underwriters' Laboratories explained new classification of load centers as "panelboards" or "service equipment." Committee was appointed to see what could be done about legislation to provide inspection in rural districts. G. E. Price, Santa Ana County inspector, described rehabilitation program in Orange County following damage by recent floods. Inspection of electrical wiring of flooded buildings presented interesting problems to determine installation failures. The adequate wiring program of the Electrical Development League was outlined by W. L. Stickel. 1937 N.E. Code conflict with the California Electrical Safety Orders was discussed. George Kimball, Industrial Accident Commission says comparison of regulations is to be made and possibly a bulletin issued to bring closer harmony. J. G. Moyen of Square D Co. demonstrated circuit breaker operation under various short circuit conditions. B. R. Meikel suggested marking circuit breaker ratings on face of the operating handle.

CENTRAL CALIFORNIA CHAPTER, held its second meeting coincident with the Pacific Coast Electrical Association's conclave in Fresno April 8. Many attending that conclave were enabled to sit in with the Central California group. Carl F. Wolf, Valley Electric Supply Co. talked on recessed and inbuilt lighting. Ralph Wiley and Harold Gerber, San Francisco, likewise discussed the same problem. George E. Kimball, Industrial Accident Commission, discussed the N.E. Code and State Safety Orders. Harold L. Gerber outlined several of the changes in the 1937 Code. Next meeting is to be a joint one in Bakersfield with Southern California Chapter.

NORTHERN CALIFORNIA CHAPTER, met at Oakland City Hall April 13 with A. V. Youens of Palo Alto, chairman. Practically the entire evening was spent in discussing Article 210 and comparing it with present requirements in most western cities. It was disclosed that not one of the cities represented had yet accepted the 1937 Code because its requirements are less than those of present city requirements. If the wattage minimum is raised to 3 watts per sq. ft. instead of 2 watts, and the articles dealing with services are improved, the new Code would be more in line with general western practice.

ALTHOUGH THE COLLECTIVE BARGAINING election held four months ago by Pacific Gas and Electric Co. employees was won by the independent, incorporated California Gas & Electric Employees Union by a 1,305 majority, the National Labor Relations Board last month decided to hold hearings on CIO charges that the election had been influenced by the company. Action of the board, the first taken since the result of the vote was announced, will further hold up—if not eventually throw out—the independent's efforts to get certification as bargaining agent.

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TWO MODIFIED CONTRACTS dealing with use of Boulder power by the Los Angeles Bureau of Power & Light and the Metropolitan Water District were tentatively approved in Washington last month. Under one contract the use of 36 per cent of the power plant output by the water district would be deferred until June 1, 1940. Under the other, the bureau would construct a third circuit to the dam in order to supply Los Angeles with an additional block of energy needed by next year.

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CONGRESSIONAL ACTION on a pending bill providing for power development at the Fort Peck, Mont.. project on the Missouri River will be taken before adjournment, House leaders promised last month. The bill would authorize the development of hydroelectric power at the dam with an ultimate installation of about 105,000 kw. at an estimated cost of $6,750,000.

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SACRAMENTO MUNICIPAL UTILITY DISTRICT directors, preparing to carry out a plan to acquire Pacific Gas and Electric Co.'s electric distribution system, last month authorized issuance and sale of $300,000 in bonds to defray cost of the condemnation proceedings. It was estimated that it will take three years to bring the proceedings to a conclusion.

●

SUBJECT TO APPROVAL by the Oregon Public Utilities Commissioner, California-Oregon Power Co. and the California Public Service Co. will construct a $130,000 transmission line to carry Copco power into Lakeview, Ore.

●

WORK OF IMPROVING its system in Rigby, Utah, was started last month by Utah Power & Light Co. following the recent granting by the city council of a new franchise. Representing an outlay of about $29,000 and requiring between 60 and 90 days to finish, the work includes moving of two blocks of line, construction of a new tie line from Rigby to Roberts and replacing the 600-kw. bank in the substation north of town with a 2,000-kw. bank.

PACIFIC POWER & LIGHT CO. and the federal government last month reached tentative agreement on power rights on the Deschutes River, Ore. As proposed, the company will waive its rights on the river below Bend, Ore., in the summer and above Bend in the winter; the government will build an additional power plant at the cove on Crooked River at an estimated cost of $170,000; the government will have summer use, the company winter use of the power generated at this plant.

●

TO EXPEDITE CONSTRUCTION of Seattle City Light's Skagit transmission line, Acting Mayor James Scavatto has ordered filing of a condemnation suit to obtain a 5-mi. right-of-way circling the town of Renton on three sides. Action was taken after Renton officials refused permission to build through the town.

●

SOUGHT LAST MONTH by Pacific Gas and Electric Co. was California State Railroad Commission authorization to construct a third 35,000-kw. steam plant. Costing $5,000,000, the plant would be built at Oleum, Calif., for Union Oil Co. The company is building similar plants at Avon for Tidewater Associated Oil Co. and at Martinez for Shell Oil Co.

●

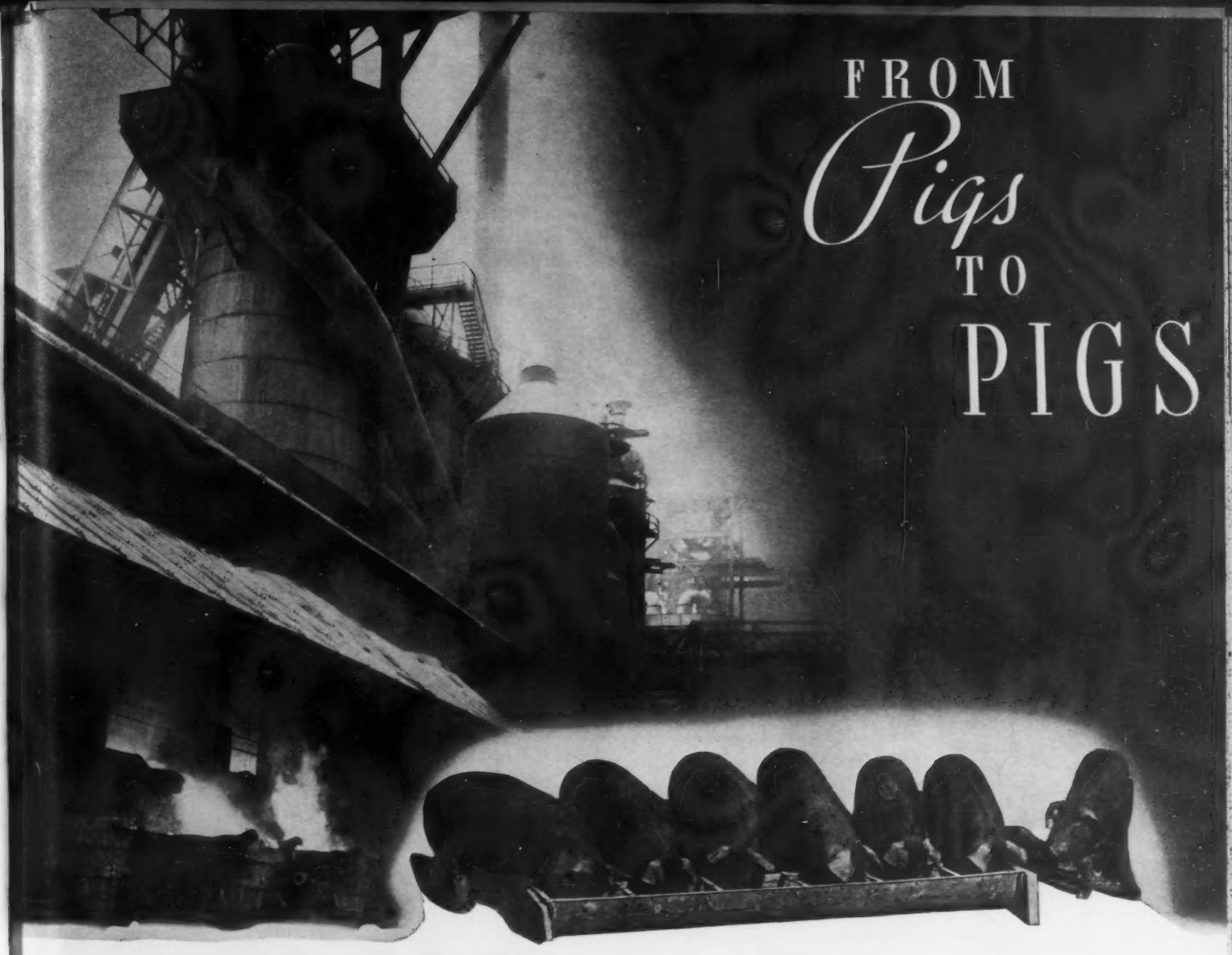
ISSUE AND SALE by Puget Sound Power & Light Co. of $7,000,000 in first and refunding mortgage, 6-per cent bonds of Series E, due Oct. 1, 1950, have been approved by the Washington State Department of Public Service. Proceeds are to be used to refund $2,919,500 of 10-yr., 5½-per cent coupon notes; $3,990,000 Pacific Coast Power Co. 5-per cent bonds.

●

PACIFIC GAS AND ELECTRIC CO., at its present rate of increase of electric distribution, can within six years absorb all power developed by the Central Valleys project, President James B. Black announced in his 1937 company report. From 1933 to 1937 the utility added 60,000 kw. a year, Black said. The Shasta Dam hydroelectric works are designed to develop 360,000 kw.

●

SUIT SEEKING to compel Electric Power & Light Corp. to pay $30,000,000 (the par value) plus interest to the Utah Power & Light Corp. for the common stock issue of the latter was scheduled to be heard in Augusta, Me., last month. Instituted by five preferred stockholders, the complaint charged that the common stock of Utah Power was issued to "its promoters as secret, undisclosed and unlawful profits" and that it is invalid unless the par value is paid to the company.



FROM *Pigs* TO PIGS

★"Modern" applies today to farms as well as cities--and *steel* has made this true. A sizeable percentage of the "pigs" (masses of metal cast in a mold) from all blast furnaces find their way to the farms in the form of steel---in plows and in modern equipment which increases production; granaries that protect the harvest; pipe, pumps and troughs by which animals are fed and watered.

On an average farm are hundreds of uses for steel. Look around your home--whether farm or city--and note how much you, too, depend on steel --hinges, stoves, cooking utensils, refrigerator, plumbing, heating and countless other uses.

Not, of course, just any steel. There are actually thousands of kinds of steel, and we have spent years and millions of dollars to equip ourselves to work with you, to find which will exactly meet your needs. No matter how small the order may be every Youngstown resource for quality is employed in its production.

THE YOUNGSTOWN SHEET AND TUBE COMPANY

Manufacturers of Carbon and Alloy Steels

General Offices - YOUNGSTOWN, OHIO

QUALITY · YOUNGSTOWN · SERVICE

Sheets - Plates - Pipe and Tubular Products - Conduit Tin Plate - Bars - Rods - Wire - Nails - Unions - Tie Plates and Spikes.

25-6A

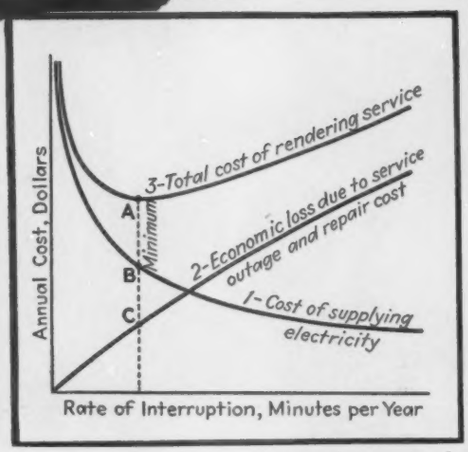
YOUNGSTOWN

From ELECTRICAL WORLD, 11-20-37

Of the many and varied operating difficulties which, at times, beset the managements of utility companies, the most intolerable is the occasion of customer service interruption.

REG U.S. PAT OFF.
FUSE LINKS

Many Power Companies Reduced Service Interruptions in '37 with S&C Fuse Links



The advantage of reducing your costs of supplying electricity are lost if your outages and service costs are not reduced.

As the experienced distribution engineer explained above—"Service Interruptions" are a serious problem . . .

But unnecessary outages can be drastically reduced.

Records covering several years of operation of cutouts with S & C Fuse Links show savings many times their cost—and conclusive proof that you, too, can guard against service interruptions by using S & C Links.

The Link is the Heart of the Cutout

The best cutout performance is possible only with the best and most accurate links. S & C Links improve cutout performance and are universally adaptable for use with other makes of cutouts besides S & C.

Use S & C Fuse Links on your lines to reduce outages . . . If you haven't Bulletin 218 "Fuse Links" on hand, let us mail you a copy. It's worth the time you take to study it.

S & C Fuse Links
The Only
Universal Link
for all Cutouts

WESTERN REPRESENTATIVES

San Francisco.....George E. Honn, 420 Market Street
Los Angeles.....Farnham & Cunningham, Edison Bldg.
Seattle.....T. S. Wood, 220 Ninth Street, North
Salt Lake City.....Riter Engineering Co., Kearns Bldg.

SCHWEITZER & CONRAD, Inc.
4435 RAVENSWOOD AVENUE . . . CHICAGO, ILLINOIS
Manufactured in Canada by Powerlite Devices, Ltd., Toronto, Can.

Ross Silent; Bonneville Situation Equally So

Bonneville developments moved slowly last month because of the silence of Administrator J. D. Ross. Events were limited to the following:

The House rivers and harbors committee, in a new regional planning measure sent to the floor, proposed that the authority of the Bonneville administrator be extended to all federal hydroelectric power projects in the Northwest.

Southern Idaho was rocked by debate on the subject, "Do we need and want Bonneville power." Only authoritative statement issued was that by the state planning board and the water conservation board to the effect that the region's supply of power is ample.

The Oregon Public Utility Commission ordered all twelve utilities under its jurisdiction to submit data by June 1 showing the possible effect of Bonneville power on existing utility operations. Purpose of the study is to assure that any savings resulting from distribution of Bonneville power will be passed on to the public. Information wanted includes:

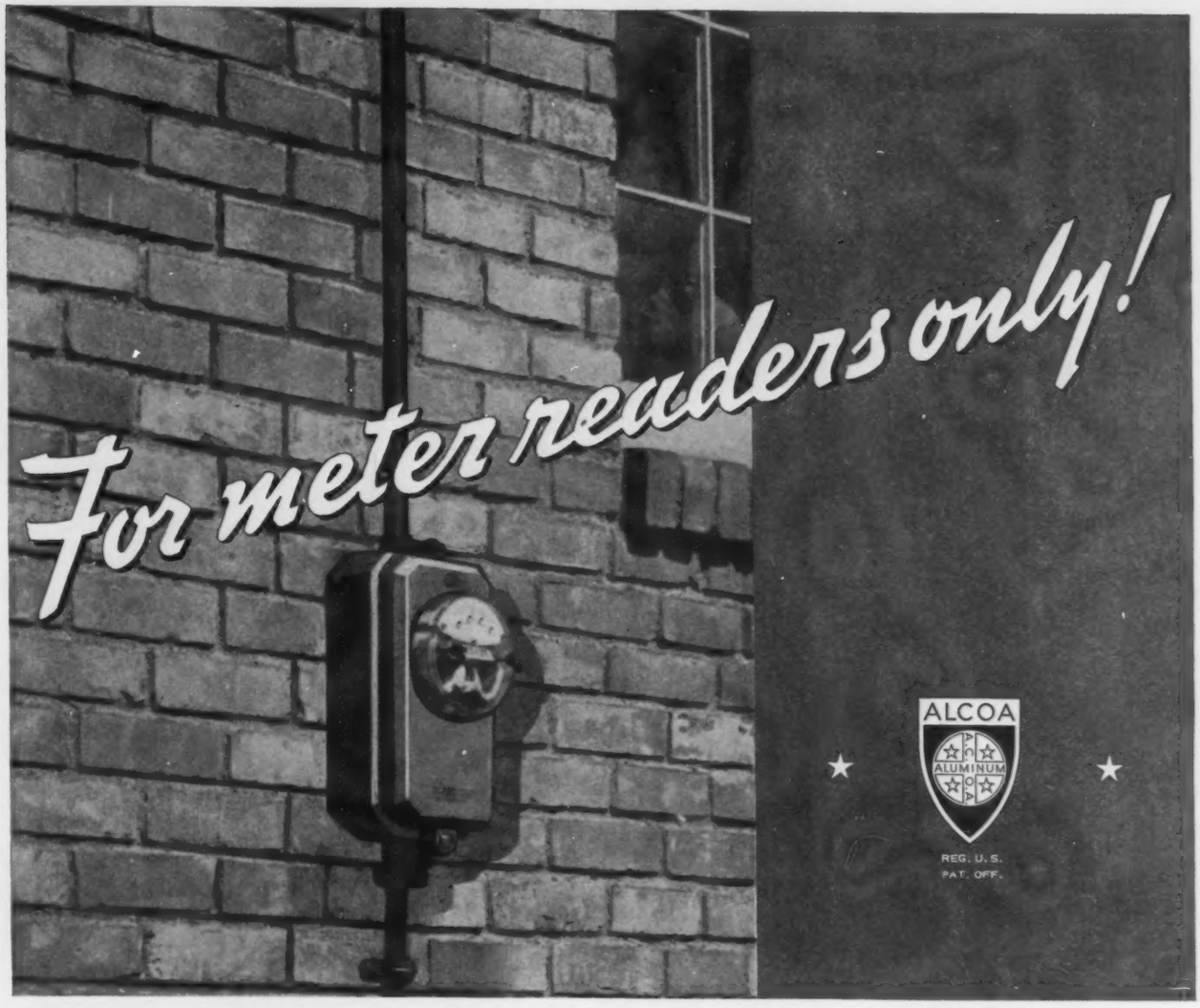
(1) Kilowatts of demand and kw.-hr. of Bonneville energy which can be absorbed in 1938, together with an estimate of increments for each year 1939-43. (2) How much of the Bonneville energy will replace existing generation. (3) Investment in transmission, substations and other facilities required to handle Bonneville power. (4) Locations at which Bonneville energy can be received. (5) Actual costs of present block of energy which will be displaced. (6) Retirements to be made from property when Bonneville power is acquired. (7) Customer data to permit determination of the effect of any acquired Bonneville energy on present rates.

●

CONDEMNATION PROCEEDINGS have been instituted in Cowlitz County, Wash., superior court against properties of Washington Gas & Electric Co. by Public Utility District No. 1 of Cowlitz County. It is the first such action to be taken in the state-wide drive for public ownership. With the filing of the suit, district commissioners authorized a $4,750,000 bond issue to cover cost of the proposed acquisition.

●

ADDITIONAL $13,000,000 for Grand Coulee construction work in 1939 was reported to have been asked last month by the Bureau of Reclamation. Engineers were said to have felt that the $13,000,000 already provided is not enough to carry on a continuous program.



MAINTENANCE MEN seldom get a look at Aluminum meter cases. They don't need to!

Aluminum is not harmed by exposure to the weather; never needs painting. There is no rusting of the cases to streak the buildings on which they are mounted. Customers, whether in the country or in the city, appreciate the added sightliness where Aluminum meter cases are used.

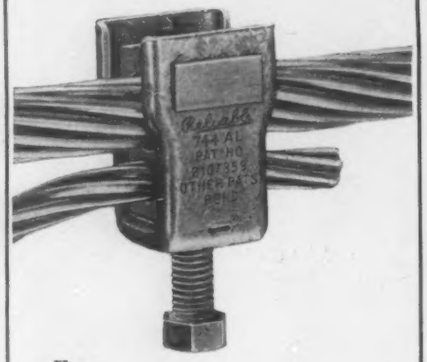
You can obtain meter cases made of Alcoa Aluminum Alloys from various manufacturers. They are formed from Aluminum sheet, or die cast with required bosses, lugs and markings cast integrally, according to your specifications. We shall be glad to send you the names of manufacturers from whom Aluminum meter cases may be purchased. ALUMINUM COMPANY OF AMERICA, 2132 Gulf Building, Pittsburgh, Pennsylvania.

ALCOA · ALUMINUM

NEW

Reliable

TAP CLAMPS



For

Tap connections to aluminum over armor rods.

Aluminum to Aluminum
Aluminum to Guy Wire
Aluminum to Copper

★ Convenient to install
★ Copper and aluminum are well separated
★ Aluminum parts of clamp contact armor rods
★ Copper surfaces contact the copper tap wire

Write for Details

Reliable ELECTRIC COMPANY
OVER 25 YEARS SERVICE TO THE UTILITIES
3145 CARROLL AVENUE · CHICAGO, ILLINOIS

INVESTIGATION OF POWER RESOURCES along main rivers and streams of British Columbia will be continued by the provincial water branch and extended as funds are available from water rentals. As a result of recent investigations, the branch estimates that possibilities exist for development of between 6,000,000 and 8,000,000 hp. Only 718,922 hp. is now developed.

●

TO BE STARTED THIS SPRING by Coast Counties Gas & Electric Co. is work on a 60-kv. line from Watsonville to Santa Cruz, Calif., with substation at Santa Cruz. Costing approximately $210,000, the job was announced subsequent to the company's original estimate of $300,000 to $400,000 for system improvements in 1938.

●

NATIONAL BATTERY MANUFACTURERS' ASSN. will hold its spring convention in Cleveland May 24-25.

●

DISTRIBUTION OF the "Standards for Welding Electrodes" recently adopted by the electric welding section, National Electrical Manufacturers' Assn., is being made through member companies and from NEMA headquarters at 155 E. 44th St., New York City.

●

NEVADA - CALIFORNIA ELECTRIC CORP. has installed a new accounting system concentrating all accounts through the main office. Conservation of floor space, more rapid accounting of the various departmental and affiliated interests of the company and quicker handling of the accounting procedure as required by the Federal Power Commission were among the reasons for the change.

●

LA JUNTA, COLO., TAXPAYERS will vote May 10 on a $497,000 bond issue to erect a municipal power plant. Southern Colorado Power Co. has already offered to construct a generating plant in the city.

●

WASHINGTON WATER POWER CO. has purchased the Rathdrum and Post Falls, Ida., distribution systems and rural lines owned by the Rathdrum Electric Co. Acquisition means lower rates for the towns' customers.

●

FRITZ ZIEBARTH, Long Beach, bidding $165,800, submitted low bid to Seattle Board of Public Works for stringing 700 mi. of wire for Skagit transmission line No. 2 from the Gorge plant to the South substation in Seattle. Other bidders were A. S. Schulman Electric Co., Chicago, asking $172,600, and Acme Construction Co., Seattle, $178,790. Bids were referred to Seattle City Light's engineering division.

REA Activities

WYOMING RURAL ELECTRIC CO., Lingle, has awarded a contract to C. E. Atwater Co., Grand Island, Neb., for constructing 150 mi. of distributing lines in Goshen County. $112,594.

CLEARWATER VALLEY LIGHT & POWER ASSN., Lewiston, Ida., has awarded a contract to H. G. Johnson, Portland, for constructing 150 mi. of distribution lines in northern part of Latah, Benewah and Whitman Counties. $136,737.

MINIMUM RATE of $1 for amounts under 12 kw.-hr. has been approved by REA for Umatilla Electric Cooperative Assn., Hermiston, Ore.

SURPRISE VALLEY ELECTRIFICATION CORP., Alturas, Calif., has been allotted $27,500 to build approximately 20 mi. of line.

UMATILLA ELECTRIC COOPERATIVE ASSN., Hermiston, Ore., has been allotted $35,000 to build approximately 33 mi. of line.

PLUMAS-SIERRA RURAL ELECTRIC COOPERATIVE, Blairsden, Calif., has awarded a contract to Fritz Ziebarth for building the entire 208.5 mi. project. $242,468.

●

Contracts Awarded

BY BUREAU OF RECLAMATION for pipe, fittings, valves for Units N-5 and N-6, Boulder Power Plant, to Ohio Injector Co., Los Angeles, $7,842; Crane O'Fallon Co., Denver, $23,460.

BY BUREAU OF RECLAMATION to International Derrick & Equipment Co. of California, Torrance, for steel structures for Metropolitan Water District and Southern California Edison Co. transformer circuits and switching station at Boulder Dam switchyard. $6,865.

BY BUREAU OF RECLAMATION to National Electric Products Corp., Pittsburgh, for tubing and bends for concrete cooling system at Grand Coulee Dam. $19,725.

BY METROPOLITAN WATER DISTRICT to Wagner Electric Corp., Los Angeles, for 18 single-phase station light and power transformers for use at main pumping plants. $11,911.

BY BUREAU OF RECLAMATION to American Bridge Co., Denver, for structural steel for one bus structure for Metropolitan Water District switching station at Boulder Dam. $10,550.

TO MALCOLM BROCK CO., Bakersfield, for constructing first unit of air cooling system on second and third floors of north wing of Kern County Courthouse. $11,986.

BY TACOMA, WASH., BOARD OF CONTRACTS & Awards to Kelman Electric & Mfg. Co., Los Angeles, for two sets of equipment to convert two 110-kv., 600-amp. Kelman oil circuit breakers to 8-cycle tripping time. $5,688.

BY BUREAU OF RECLAMATION for metalwork to go into trash-rack structures to strain water passing through the outlet and penstock works at Grand Coulee Dam. To Bethlehem Steel Co., Bethlehem, Pa., $323,026; John W. Beam, Denver, $19,750; Mississippi Valley Structural Steel Co., Melrose Park, Ill. $58,300.

BY BUREAU OF RECLAMATION for use at Shasta Dam camp. To Westinghouse Electric & Mfg. Co., Denver, and Wesix Electric Co., San Francisco, for 102 electric water heaters, $4,086; to Rutenber Electric Co., Marion, Ind., and Malleable Iron Range Co., Beaver Dam, Wis., for 89 electric ranges, $3,992.

Specially designed **"Bride's Blue"** carton with plenty of Gift Appeal!

$6.05 VALUE now ONLY

$4.95

New Delray Model Black Moldex Trim (red $6.35 Value for $5.25) with STRAINEX

is the time to "CASH IN" on our big

Genuine SILEX

TRADE MARK REGISTERED U.S. PAT. OFF.

"BRIDE'S SPECIAL"

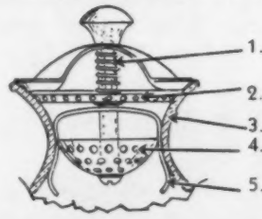
combination glass coffee and tea maker

Smashing through with a **"Bride's Special"** value—available in both electric table and kitchen range models—and an intensive, hard-hitting, advertising drive—SILEX offers you the big opportunity of the Wedding Gift season.

With such tremendous, sales-making support and the Silex reputation as the pioneer glass coffee maker that revolutionized the entire art of coffee brewing, this promotion is the event of the day. Get behind Silex. Tie in with **"Bride's Special"** counters and window displays! Your best customers will be repeatedly sold by Silex advertising in the magazines listed below.

"BRIDE'S SPECIAL" OFFER GOOD ONLY 'TIL JUNE 30, 1938

Strainex . . . . "It strains as it pours"



1. Spring presses disc against neck of bowl.
2. Self-aligning perforated disc; stops small leaves.
3. Neck of tea maker bowl.
4. Strainer stops large leaves, allows free flow of tea.
5. Spring clip holds strainer in neck of bowl.

Converts lower Silex bowl into a self-straining tea maker

HERE'S THE DEAL

that will make Profits Soar . . . The very latest Silex Glass Coffee Maker, the Delray Model in black or red Moldex trim with the newly designed Delray stove and STRAINEX, for making delicious tea, "it strains as it pours". In black only **$4.95**. (red trim $5.25).

And now for those customers who want a kitchen range model—a model for use directly over the open flame of a gas, electric, coal, oil or wood stove—here is an irresistible "Bride's Special". A Kitchen Range Model Silex Glass Coffee Maker with either black or red trim—and a Strainex. Every bride will be thrilled with this gift—and doubly thrilled with this bargain price—a $3.55 value for only **$2.95** in black--a $3.85 value for only **$3.25** in red.

The beautiful new Delray stove is low, graceful and embodies the famous Silex "quick cooling" feature . . . **BREWING COMPLETED WITHOUT REMOVING GLASS FROM STOVE**

And remember—that the Bride's Special also includes other Silex exclusive features: Pyrex Brand Glass, guaranteed against heat breakage; exclusive patented Silex filter that insures clear, clean coffee free of all sediment.

29,712,349 Advertisements

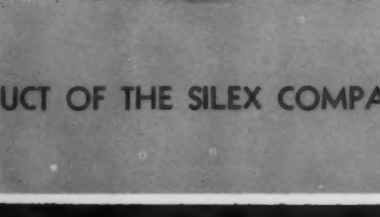
Concentrated During the "Wedding Season" in these Leading Magazines—

The Saturday Evening Post
McCall's ◆ House Beautiful
Woman's Home Companion
House & Garden ◆ The New Yorker
Better Homes & Gardens
American Home ◆ This Week
Good Housekeeping
American Weekly ◆ Harper's Bazaar
Ladies' Home Journal

$3.55 VALUE now ONLY

$2.95

Kitchen Range Model Black Moldex Trim and a $1.85 Value for $1.25 with STRAINEX



Let these ads appearing in magazines listed sell SILEX for you.

THERE IS ONLY ONE Genuine SILEX

THE PRODUCT OF THE SILEX COMPANY, HARTFORD, CONN.

A GRIP FOR ALL NEEDS

No. 1628-5 B.
"Chicago" Grip.
Maximum opening .563.
Minimum opening .115.
Safe Load, 8,000 lbs.

Here's the new "Chicago" Grip capable of handling messenger or guy strand from 3/16 in. diameter up to 1/2 in. diameter. A genuine all purpose grip that can also be used satisfactorily on bare conductors, solid or stranded, from No. 6 to No. 4/0 seven strand copper and A.C.-S.R. up to No. 3/0. A grip that even satisfactorily handles the new three-strand "copperweld" conductor. The bronze-lined jaws prevent slippage. This new grip will afford a sure hold under all conditions, with loads up to 8,000 lbs.

DISTRIBUTED THROUGH JOBBERS

Foreign Distributor: International Standard Electric Corp., New York

---

The four pamphlets listed below will be sent without charge to anyone interested. Check the ones you want:

- ☐ Safety for the Pole Climber.
- ☐ Specifications on Linemen's Belts and Safety Straps.
- ☐ The Safety Factor on Linemen's Leather Goods.
- ☐ Pocket Tool Guide.

Mathias KLEIN & Sons
Established 1857 Chicago, Ill. U.S.A.

3200 BELMONT AVENUE

Colorado-Big Thompson's Path Cleared by Ruling

Major obstacle in the path of the Colorado-Big Thompson reclamation and power development in Colorado was removed late in March when Acting Comptroller General Richard N. Elliott ruled that advance contracts covering repayment of the federal construction money will be necessary only in respect to that part of the project devoted to reclamation.

As authorized under the Reclamation Act, the development contemplates the diversion of about 300,000 acre-ft. of water from the Colorado River through a 13-mi. tunnel under the continental divide to a tributary of the South Platte, where it will be used for supplemental irrigation of 815,000 acres of land now under cultivation.

An irrigation district organized under state law is prepared to guarantee the usual return to the federal government, under the 40-yr. amortization plan, of the $24,800,000 reclamation investment. It is prohibited by its charter, however, from engaging in the power business and therefore cannot assume any obligation for the $6,902,772 tentatively allocated to the development of incidental power.

The comptroller general's ruling makes it possible to proceed with the plans with the assurance that, when bids are called, no legal obstacle will tie up the $900,000 already appropriated from the reclamation fund for beginning construction.

●

FIRST OF TWO diesel-powered electric generators which Salt River Valley Water Users Assn. will place in its new standby plant near Tempe, Ariz., was scheduled to be ready for operation May 1. The second unit will be ready by July. The new plant, which represents an investment of approximately $1,000,000, will add 10,000 kw. to the present system. It will replace the standby steam plant of Central Arizona Light & Power Co.

●

ELECTRIC HOME & FARM AUTHORITY has closed a contract with Inland Empire Rural Electrification, Inc., Spokane.

●

MINERAL COUNTY (NEV.) LIGHT & POWER CO. is retiring $10,000 in bonds which are not due until 1940 and 1941. The move will leave $10,000 of the original bond issue of $150,000 to be paid off.

●

GROSS OPERATING REVENUES of California Oregon Power Co. totaled $4,652,504 in 1937, an increase of $225,246 over 1936.

GROSS OPERATING REVENUES of Pacific Gas and Electric Co. totaled $100,443,116 in 1937 as compared with $95,333,336 in 1936. Net income to surplus showed a decrease of $57,780.

●

GROSS OPERATING REVENUES of San Diego Consolidated Gas & Electric Co. totaled $8,196,163 in 1937 as compared with $7,833,279 in 1936.

●

GROSS OPERATING REVENUES of Southern Colorado Power Co. totaled $2,336,744 in 1937, an increase of $124,243 over 1936.

●

PRODUCTION OF ELECTRICITY for public use in the eleven Western states during February totaled 1,692,145,000 kw.hr., as compared with January's 2,186,131,000 kw.hr. Total installed capacity of waterwheels in 521 water power plants of 100 hp. or more on Jan. 1, was 6,230,951 hp.

●

PASADENA (CALIF.) MUNICIPAL LIGHT & POWER DEPT. closed down its steam generating plant late in March when Boulder Dam energy was turned into all city distribution lines. The steam plant, turbines of which are being overhauled, will not be put in operation until next fall unless an emergency arises. The city is under contract to take 68,000,000 kw.hr. of Boulder power annually.

●

Polson Dam to be Finished July 1, One Year Early

Polson Dam of the Flathead hydroelectric project, Mont., neared completion last month — one year ahead of time—when the diversion tunnel through which the river has been detoured for the last two years was closed and the penstock intake opening temporarily sealed.

Not until about the first of July, however, will the 56,000 kw. of energy generated be turned into Montana Power Co.'s distribution lines. In the interval, work will be pushed on the completion of the penstock tunnel interior and installation of the last of the powerhouse equipment, including water wheel and generator.

Addition of the new energy will increase the utility's installed capacity from 294,000 to 350,000 kw.

The water storage outlook will be similarly improved. Damming the river will add 1,100,000 acre-ft. to the present capacity of 578,000 acre-ft. Not only that, but present reservoirs which were last year virtually dry are now 31 per cent full—this in spite of the fact that the spring run-off has not yet been figured in.

ABOUT PEOPLE

Utah Electrical League Elects W. O. Smith President

W. O. Smith, district sales manager of General Electric Supply Corp., has been elected president of the Electrical League of Utah succeeding W. A. Huckins, Utah Power & Light Co. sales manager. G. W. Forsberg, Wasatch Electric Co., is vice-president; Robert Nevins, secretary-treasurer.

Named manager, a new position created as a result of the retirement as executive secretary of R. E. Folland, was Elias Strong, Utah Power & Light Co. salesman.

Directors, according to sub-groups within the industry, are: Dealers—Ken L. Olsen, Hyrum B. Summerhays, C. W. Gilner and Nevins. Jobbers—Paul J. Devine, D. W. Salsbury, W. E. Gnadt and Smith. Manufacturers—B. F. Raymond, B. C. J. Wheatlake, L. E. Brown and F. N. Warwell. Utilities—C. A. Wolfrom, Franklin S. Cundiff, Lawrence F. Thompson and Huckins. Contractors—H. H. Hall, Frederick C. Wolters, Kimball Vance and Forsberg.

●

H. E. SANDERSON

H. E. SANDERSON, for many years Pacific Coast district manager for Bryant Electric Co., has been named a special representative of the Bryant plastics division. He is succeeded as manager by F. C. Scharr, formerly field representative in the Seattle territory. Schaar is succeeded in Oregon and Washington by Fred G. Phillips, former salesman for the North Coast Electric Co., Seattle, and the Home Electric Co., Tacoma.

●

CHARLES A. PIERSON, vice-president of Standard Electric Mfg. Co., Toledo, Ohio, visited the Pacific Coast last month.

HAVE YOU TRIED IT?
THE CUTOUT THAT
MAKES POSSIBLE
LOW-COST RECLOSING
ON BRANCH CIRCUITS
The G-E reclosing cutout is available in 50-ampere ratings at 5000 volts and 7500/12,500 gr-Y volts

HOW IT OPERATES

After a temporary fault, this cutout restores service by means of a second fuse link which is automatically connected in the circuit after the first fuse link blows. The interruption is so brief that motors and other devices will continue in service.

CONVERT YOUR STANDARD CUTOUTS

Because the reclosing feature is entirely in the door, you can convert any G-E 50-ampere enclosed indicating and drop-out fuse cutout now in service—simply by removing the present door and putting on the new reclosing door. Ask your G-E representative for complete information, or write for Bulletin GEA-2707. Address General Electric, Schenectady, N. Y.

GENERAL ELECTRIC

340-35D

LINCOLN DEMAND METERS

Eliminates LOSS OF DEMAND READING

TYPE WD

Absence of all rapidly moving parts, contacts, and timing mechanisms results in a meter of exceptional dependability and eliminates loss of demand readings.

SEND FOR YOUR COPY OF CATALOG TO

LINCOLN METER COMPANY
SPRINGFIELD, ILLINOIS

FULL REVENUE
For ALL the Loads
When You Use

Sangamo Type HFS Socket Meter

MODERN METERS

Sangamo Type HFA Conventional Service Meter

For MODERN LOADS

Western Offices:
LOS ANGELES 326 Subway Term. Bldg.
SAN FRANCISCO 1061 Howard St.
SEATTLE 220 Ninth Ave. N.
PHOENIX 448 W. Madison St.
DENVER 1526 Blake St.

SANGAMO ELECTRIC COMPANY
SPRINGFIELD, ILLINOIS

CHARLEY E. CAREY of the engineering staff of the Bonneville administration office, Portland, has been named principal construction engineer in charge of all engineering and construction for the Bonneville administration. Prior to joining the Bonneville staff he was associated with Westinghouse Electric & Mfg. Co. as engineering supervisor for the Northwest. First major job in his new post will probably be construction of a 115-kv. transmission line from Bonneville to Portland via the Washington shore of the Columbia River, survey of which began early in April.

●

E. F. PEARSON, former chief engineer of Northwestern Electric Co., has been named assistant to President Paul B. McKee of Pacific Power & Light Co. In his new position his services as an advisor will be available to the Northwestern company, the engineering department of which has been consolidated with the operating department under Walter J. Dennis, assistant general manager.

●

WILLIAM T. COMYNS has been elected secretary of the Los Angeles Electrical Estimators Club to succeed the late Theodore Ill.

●

GEORGE R. WYER has taken over his new duties as manager of the Vancouver branch of the Canadian Fairbanks-Morse Co., Ltd.

●

RUSSELL F. MILLER, superintendent of Station L, Portland General Electric Co.'s largest steam plant, has joined Lunkenheimer Co. He is succeeded by W. E. Briggs.

●

FRANKLIN T. GRIFFITH, president of Portland Electric Power Co., has been selected to membership of the board of the Portland Shrine Hospital for crippled children.

T. M. Robins Succeeded at Bonneville by J. C. H. Lee

Col. T. M. Robins, for the past four years chief engineer of the North Pacific Division, U. S. Army Engineers, Portland, and in charge of Bonneville construction, will be transferred to Fort Belvoir, Va., where he will command the army post and engineers' school, about May 10. He is succeeded by Col. John C. H. Lee of the Philadelphia District of the Army Engineers.

The North Pacific Division is now divided into two districts: one, with headquarters in Portland, headed by Maj. S. L. Damon; the other, with headquarters at Bonneville, headed by Maj. T. D. Weaver.

●

DAVE MORRIS, Washington and Oregon representative of the Arrow Electric Division, Arrow-Hart & Hegeman Co., has been named representative of the Hart & Hegeman Division of the company.

●

HARRY L. DALBY, formerly with the U. S. Army Engineers at Bonneville on electrical installation work, has joined Consolidated Builders, Inc., contractor on the new Grand Coulee contract, in a similar position.

●

N. G. SYMONDS, Stanford University graduate and Westinghouse vice-president, has been assigned to devote his time in the sales department to specific customer activities, association work and special duties.

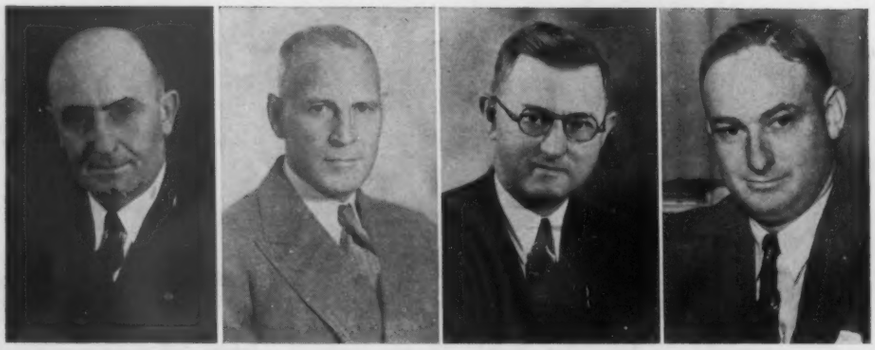
●

JERRY SHERRETT has joined the sales force at Ray Segurson's appliance store, Portland.

●

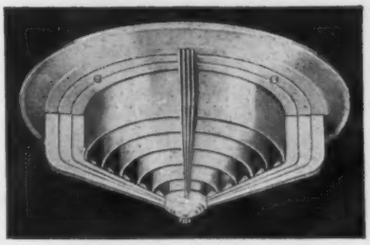
F. E. BOYD, vice-president of Pacific Electric Motor Co., Oakland, is on a three months' trip to eastern cities.

Edison Company Sales Department Reorganized



Southern California Edison Co. reorganizes its sales department. Reporting directly to C. E. Houston (left), commercial manager, is R. C. McFadden (second left), new business manager who has been placed in charge of all sales activities. H. C. Rice (second right), merchandise manager, is now manager of domestic sales; George N. Hawley (right), former assistant new business manager, is manager of industrial sales

Store Lighting that SELLS



Leading merchandisers have learned that STER-LITE FIXTURES help sell merchandise.

And Contractor after Contractor has learned that STER-LITE FIXTURES help in selling merchants.

You are away out in front with America's Number One selling light when you present STER-LITE FIXTURES. Write for FACTS and Figures.

Sterling

H. B. Squires
Representative
LOS ANGELES–SEATTLE
SAN FRANCISCO

STERLING REFLECTOR CO.
1431 W Hubbard St CHICAGO

Crapo
GALVANIZED PRODUCTS

STEEL STRAND

Telephone and Telegraph Wire

Crapo Galvanized Wire and Steel Strand can be spliced and served without injury to the heavy, protective zinc coating. The perfect adhesion of this tough, ductile coating to the wire enables it to withstand sharp bending and twisting, produces corrosion-resisting joints, makes for longer life, lower maintenance costs.

Crapo Galvanized Seven-wire Steel Strand and Telephone Wire are readily available in all standard grades and sizes from representative Supply Jobbers.

INDIANA STEEL & WIRE CO.
MUNCIE, • INDIANA

Radio, Appliances Committees Appointed in Vancouver

Alex Forst, chairman of the radio and electrical home appliance division of the Vancouver, B. C., Retail Merchants' Assn. has appointed the following committees:

Wholesaler - consumer - finance committee: G. Langtry Bell (honorary chairman of the division), J. Drain, F. L. Kennedy, J. Steele, A. Thomason, Howard Walters and Forst. Trading practice performance committee: R. W. Bishop, P. C. Graham, Clare Kelly, M. A. Kelly and Kennedy.

Membership committee: R. M. Brown, M. D. Saunders, L. Stevens, Mel Thompson and Graham. Trade-in schedule committee: A. G. Meekison, Bell, Bishop, Forst and Clare Kelly. Program committee: Joe Bragg, G. L. Meikle, M. A. Kelly, Steele and Walters. Executive committee: Sid Thompson, Drain, Graham, Clare Kelly, Kennedy, Meekison and Walters.

●

CHARLES KIRK, formerly connected with Southern Colorado Power Co., has been appointed manager of Burbank (Calif.) Public Service Dept.'s appliance division.

●

HAROLD W. SQUIRES, electrical engineer in the San Francisco district office of John A. Roebling's Sons Co., has resigned to become industrial engineer for the Chamber of Commerce.

●

JOHN F. W. SMITH, credit manager of Northern Electric Co.. Vancouver, B. C., since 1934, has been transferred to the company's Montreal office.

●

AUTHUR ALBER, Los Angeles attorney, has been appointed to succeed Earl S. Anderson as California Registrar of Contractors. Anderson is now manager of the construction industries department of the Los Angeles Chamber of Commerce.

●

HAROLD HUBBARD and Joe Newland of the Incandescent Supply Co., San Francisco office, have been given larger territories to cover. Hubbard will call on certain accounts in metropolitan San Francisco; Newland will cover Oregon, Washington, Montana, Idaho and Utah.

●

Speakers

Before the advertising and sales bureau of the Vancouver, B. C., Board of Trade—Charles R. Brenchley, sales manager for Neon Products West Cananda, Ltd., and Ruddy-Duker Co., Ltd.: "Depression years brought a more scientific approach to advertising."

At a meeting of salesmen handling

THE
FAIRMONT
San Francisco

☆

CORDIALLY WELCOMES

Pacific Coast Electrical Association

MAY 25 to 28

☆

Your convention headquarters—overlooking San Francisco Bay from storied Nob Hill. Chinatown, shopping and theater centers within 4 minutes. Garage in building.

Make early reservations.
Rates from $3.50

B. V. McMENAMIN, Res. Mgr.

THERE ARE "BESTS" IN EVERY INDUSTRY

IN ELECTRICAL APPLIANCES IT'S

Sunbeam

★ Automatic MIXMASTER ★ Double-Automatic IRONMASTER ★ Silent AUTOMATIC TOASTER ★ COFFEEMASTER ★ WETPROOF HEATING PAD ★ MASTER CORD and PLUG SET ★ GLASS COFFEE MAKERS FANHEATER ★ FLAT TOASTER ★ Automatic CLOTHES SPRAYER.

Made and guaranteed by

CHICAGO FLEXIBLE SHAFT COMPANY
5600 West Roosevelt Road, Chicago, Ill.
316 Commercial St., Los Angeles, Cal.
921 11th Ave. N., Seattle, Wash.
224 S. W. Temple St., Salt Lake City, Utah
47 YEARS MAKING QUALITY PRODUCTS

refrigerators of the Northern Electric Co., Ltd., in British Columbia—T. C. Clarke, district manager; M. D. Brooks, merchandising manager, and W. T. Huhband, assistant merchandising manager.

Before the Vancouver, B. C., branch of the AIEE—D. C. Van Horne, Canadian General Electric Co.: "Every home of reasonable size, every store, theater and office building is a prospect for air conditioning." D. B. Thomas, Canadian General Electric Co.; "Engineering Aspects of Air Conditioning."

At the final meeting of the weekly wiremen's schools held in Boise, Pocatello, Payette and Twin Falls—Jacob A. Kahn, district manager, G. E. Supply Corp., Salt Lake City; J. M. Robinson, president and general manager, Idaho Power Co.; William Keer, state director of vocational education; Floyd Pollard, president, Twin Falls wiremen's group; J. V. Otter, instructor; C. D. Purkhiser, president, Adequate Wiring Assn. of Idaho, and T. L. Masingill, Payette.

At a meeting, sponsored by the G. E. Supply Corp.'s salesmen's club, of 125 southern California electrical contractors doing bungalow and residential wiring—Walter Stickel, head of the adequate wiring development program of the Electrical Development League of Southern California. (He also spoke at the March 28 meeting of the Los Angeles branch, Southern California Chapter, NECA).

At a meeting of officials of Nevada schools, in the vicinity of Reno—Morris Hixson, Pacific district manager, incandescent lamp department, General Electric Co.; Leo Gianini, illuminating engineer, and A. E. Longmate of the same department: School lighting.

Over station KOL, Seattle—J. J. Agutter, Seattle electrical contractor and former president of the contractors' association and electrical club; Necessity for adequate home wiring.

At the fifth annual sales convention of the Edison Electric Institute in Chicago March 29-31—Dr. Adam S. Bennion, Utah Power & Light Co.: "But the Most Important of These is Men;" R. E. Fisher, Pacific Gas and Electric Co.: "Sales Department Survey and Analysis;" E. G. Stahl, San Joaquin Light & Power Corp.: "Five Years of Better Light-Better Sight in the West," and Kinsey M. Robinson, Idaho Power Co.: "Recent Developments in Electric Water Heating."

●

ELECTRICAL TESTING LABORATORIES

Electrical Photometrical, Chemical and Mechanical Tests. Inspection of Materials and Apparatus at Manufactory.

80th St. and East End Ave., New York

Classified Section

- **COST of undisplayed classified ads is 5 cents a word, minimum $1.00 insertion. Box numbers in care of our San Francisco office count as 10 words additional in undisplayed ads.**
- **RATES per column inch of displayed ads is $3.75.**
- **All classified ads are payable in advance.**

ELETCRICAL WEST 883 Mission Street San Francisco, Calif.

Wanted: Horizontal hydraulic turbine, approximately 2,000 hp., effective pressure 110 lb., with or without generator. Good condition. Address Box 150, Electrical West, 883 Mission St., San Francisco, Calif.

Deaths

SIDNEY JAMES HALLS, 57, manager of the light and power department, B. C. Electric Railway Co., Victoria, died April 8. Mr. Halls first joined the railway company in Vancouver. Transferred to Victoria in 1908, when the company was still chiefly interested in street railways, he built up the light and power department until it became the company's major activity.

●

JOSEPH W. GOSLING, noted decorative designer for the General Electric illuminating laboratory, died April 4 at Schenectady. Mr. Gosling had just returned from the Pacific Coast where he had been working on the spectacular lighting effects for the Golden Gate International Exposition. He was responsible for the lighting of practically every world's fair since the P.P.I.E. in 1915.

●

S. WALTER HUTCHINGS, 36, for the past three years manager of the Bountiful, Utah, municipal light and power plant, died last month of complications following an operation. Born in Lehi, Utah, he had previously been manager of the Lehi Municipal Power Co. plant.

TRADE NOTES

EASY WASHING MACHING CO.'s western district offices in San Francisco are being moved to the 5th floor, Western Furniture Exchange about June 1, according to Fred S. Fenton, regional manager. The company has occupied space at 879 Mission Street for many years. Warehousing now will be handled both in Oakland and San Francisco by warehousing companies and the district offices alone will be maintained in the Furniture Exchange building.

●

FRANK D. FAGAN CO., San Francisco, has been appointed northern California representative for the Accurate Mfg. Co., manufacturer of friction and rubber tapes; California and Nevada representative for Standard House Furnishings Corp., manufacturer of table lamps; northern California representative for Sola Electric Co., manufacturer of transformers; California representative for M. M. Fleron & Son, Inc., manufacturer of radio specialties, and northern California representative for Angelus Chimes Co., manufacturer of door chimes.

●

G. A. FLETCHER MUSIC CO., LTD., Nanaimo, B. C., has installed a complete model kitchen.

●

HUNTER RADIO, Hollywood, Wash., has remodeled its store and inaugurated a new sales policy.

●

GLOBE ELECTRIC CO., Seattle, Puget Sound representative for the Fairbanks-Morse line, has extended its territory south to Vancouver, Wash., and east of the Cascades.

●

The May Company in Denver has opened a new appliance store at 1226 Broadway known as "The May Company Crosley Store." It taps a residential district of its own and has a separate sales organization.

★ *For Quick Service on Quality Products from Local Stocks*

Get in Touch with: **GEO. E. HONN CO.**

420 MARKET ST. SAN FRANCISCO, CAL.

MANUFACTURER'S REPRESENTATIVE FOR:

PYREX INSULATORS
BREWER-TITCHENER HARDWARE
Corning Glass Works
FUSES, CUTOUTS, DISCONNECTS, PROTECTIVE DEVICES
Schweitzer & Conrad, Inc.
CAPACITORS
Cornell-Dubilier Corp.
World's Largest Exclusive Mfgrs. of Capacitors
TRANSFORMERS
Gardner Electric Mfg. Co.
Power and Distribution Transformers
Lee Skipwith & Co., Inc.
Niagara Air-Insulated Current Transformers
CABLE GRIPS
Kellems Products, Inc.

CONNECTORS, GROUND ROD CLAMPS, UTILITY HOISTS
Jasper Blackburn Products Corp.
GROUND LINE POLE TREATMENT
Osmose Corp. of America
METERING INSTRUMENTS
Landis & Gyr., Inc.
CROMPTON TONG TEST METER
Columbia Electric Mfg. Co.
UNDERGROUND TOOLS & EQUIPMENT
T. J. Cope, Incorporated
TREE TRIMMING EQUIPMENT
Bartlett Manufacturing Co.
FRICTION AND RUBBER TAPES
Clifton Manufacturing Co.

CHROMALOX

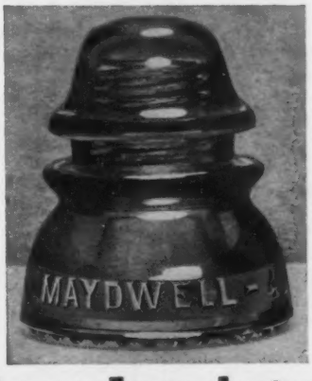
...ner-Speed
...RANGE
...ITS

Recognized as one of the most powerful influences spreading the big news of *modern electric cooking.* Now furnished on many ranges. *Right* for replacement jobs—they fit all ranges.

Represented by
MONTGOMERY BROTHERS
911 Western Ave., Seattle, Wash.
1501 N. W. Kearny St., Portland, Ore.
61 Fremont St., San Francisco, Calif.
912 E. Third St., Los Angeles, Calif.
THE PETERSON COMPANY
1921 Blake St., Denver, Colo.

EDWIN L. WIEGAND CO.
7540 Thomas Blvd. Pittsburgh, Pa.

MAYDWELL



Glass Insulators

All Standard Numbers For All Purposes

Made of high quality materials in a modern Pacific Coast plant producing an unusually tough glass to withstand all severe service conditions.

MAYDWELL & HARTZELL
INCORPORATED
Electrical Engineers and Manufacturers' Representatives
San Francisco Los Angeles Portland

M. A. KELLY CO., LTD., Vancouver, B. C., has taken over the musical and electrical appliance business operated at 659 Granville St.

●

SOBRIO NORGE STORE is a new Reno electric appliance shop, handling the Norge line and the Bendix Home Laundry, located at 136 Sierra St. Proprietor is Alex Sobrio; sales manager, George Smith.

●

ST. ANTHONY (IDA.) ELECTRIC has added the Bendix automatic washer to its line. A new baby in Manager H. O. Eddie's home provides ample clothes for demonstration purposes.

●

FLOYD'S RADIO & ELECTRIC SHOP is a new appliance store opened in Downey, Ida., by Floyd Sparrow.

●

PHOENIX (ARIZ.) RADIO & SUPPLY CO., one of the largest appliance stores in the state, has been opened at 621 N. Central Ave. H. L. Stevenson is president; Mrs. Ruth L. Hogg, secretary, and Stanley R. Iverson, sales manager.

●

MAYTAG SHOP, Salt Lake City, is now carrying the complete line of Hotpoint ranges and refrigerators.

●

DUNSMUIR ELECTRIC CO., 2936 W. 13th Ave., Vancouver, B. C., is a new repair and general electrical contracting shop opened by Earle Dunsmuir, formerly with Universal Electric Co.

●

FRANK H. BRAN CO., San Francisco and Los Angeles, is Pacific Coast representative of Colt's Patent Fire Arms Mfg. Co., electrical division.

●

DOWNING'S is a new appliance store opened in Fresno, Calif., at 2047 Merced St.

●

FIRST MANUFACTURERS licensed to sell Polaroid Lighting, Inc.'s, new glareless illumination products are Faries Mfg. Co., Decatur, Ill.; Griest Mfg. Co., New Haven, Conn.; Mutual Sunset Lamp Mfg. Co., New York, and Sight-Light Corp., Essex, Conn.

●

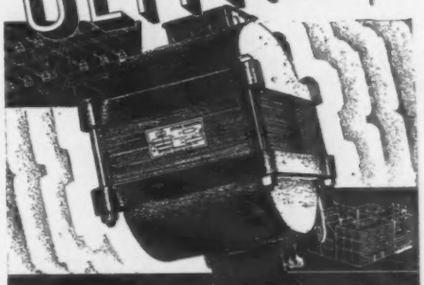
Moved

DESMOND & HAMMOND, LTD., Los Angeles electrical appliance store, to new buliding at 833 N. Highland Ave. One side of store is of plate glass, thus permitting passing motorists to see entire display room.

WARD REFRIGERATION SALES & SERVICE, Reno, to new store at 331 Sierra St.

GENERAL ELECTRIC CO's Northwest headquarters office, Portland, from Electric Bldg. to Public Service Bldg., where it now occupies the former general office of Pacific Power & Light Co. which moved elsewhere in the same building.

JEFFRIES



TRANSFORMERS

Save Their Cost and Pay Dividends by—

1. Elimination of duplicate conduit runs.
2. Saving in power rate.

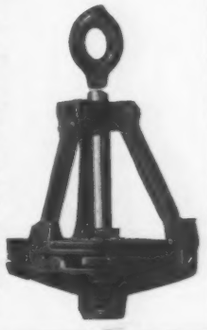
(Put all of your 110-volt equipment on a 220-volt or 440-volt power circuit, it is economical.)

JEFFRIES TRANSFORMER COMPANY
5706 Long Bech Ave. Los Angeles

New nut housing. Locks Anchor firmly on rod. Rod cannot slip thru Anchor when being installed.

EVERSTICK ANCHORS...

Engineers appreciate Everstick features which assure safety, long life and ease of installation in any soil condition. A complete line of 3 types of expanding Anchors and rigid types of Cone Anchors. All sizes and holding capacities. Write for Everstick literature including new folder on Rural Electrification Lines.



EVERSTICK ANCHOR CO.
FAIRFIELD, IOWA

PRODUCT DATA

Free to you . . . Any of these instructive bulletins simply by addressing a post card to ELECTRICAL WEST and asking for the desired bulletin by number.

501:
PYRANOL CAPACITORS for central station application; handsome booklet showing by means of pictures the sequence of steps in manufacture of capacitors. General Electric.

502:
"TREATMENT AND INSPECTION of Creosoted Pine Poles;" report of the transmission and distribution committee, Edison Electric Institute.

503:
PERMAFLECTOR LIGHTING for jewelry stores; booklet completely illustrating various phrases of actual installations. Westinghouse.

504:
VARNISHED CAMBRIC CABLE and network cable; two booklets, former giving description, applications, physical and electrical properties. Anaconda Wire & Cable Co.

505:
OUTAGE FREE HIGH VOLTAGE DISTRIBUTION TRANSFORMERS; illustrated pamphlet covering construction of Allis-Chalmers Mfg. Co.'s type CB distribution transformers.

506:
ELECTRIC OPERATORS to open and close gates, etc; file folder containing complete information. Selectron Co.

507:
PORTABLE ELECTRIC TOOLS catalogued. Black & Decker Mfg. Co.

508:
WATER HEATERS, catalogue describing models, characteristics, specifications, installations. Edison General Electric Appliance Co.

509:
1937 NATIONAL ELECTRICAL CODE; pictorial presentation. General Electric.

510:
TYPE SM FUSES for heavy-duty current-interrupting service; bulletin giving functions, construction, operation and applications. Schweitzer & Conrad, Inc.

511:
LIFE HISTORY OF GEORGE WESTINGHOUSE, published by American Society of Mechanical Engineers. Westinghouse.

512:
"TIP-OVER" SWITCH which automatically turns off ignition of motor vehicle which falls on its side in an accident; especially applicable for company trucks. Durakool,Inc.

513:
CONNECTING DEVICES for portable electrical equipment catalogued in leaflet. Bryant Electric Co.

514:
VENTILATING AND EXHAUST FANS catalogued and illustrated. Emerson Electric Mfg. Co.

515:
LIVE LINE EQUIPMENT; catalogue describing applications of listed devices. A. B. Chance Co.

516:
POWER AND POLE LINE EQUIPMENT; 240-page, fabricoid-bound catalogue; third of a series. General Electric Supply Corp.

517:
MERCURY SWITCHES; booklet giving six pages of descriptions and applications. Durakool, Inc.

518:
DIMMERS for controlling theater lighting by an adjustable ratio auto-transformer; applications and descriptions. Ward Leonard Electric Co.

519:
PARKWAY CABLE; catalogue giving descriptions, applications, properties. Anaconda Wire & Cable Co.

520:
PYRANOL CAPACITORS for distribution systems; 52-page book giving reactive kva on power systems, applications, operating problems, etc. General Electric Co.

521:
MECHANICALLY HELD AUTOMATIC TRANSFER SWITCHES; bulletin with diagrams, charts and technical information. Automatic Switch Co.

522:
AUTOMATIC CONTROLS for opening gates, etc., brochure and folder outlining features and function. Selectron Co.

523:
"ELECTRIC DRIVE SELECTOR and Hints on Maintenance" is a pamphlet to help plant maintenance men in selecting a motor. Westinghouse Electric & Mfg. Co.

524:
RUBBER INSULATION for wires and cables; booklet describing properties of insulation and installation data pertinent to service up to 5,000 volts. Okonite Co.

525:
TRUCK UTILITY SERVICE BODIES catalogued. Baker-Raulang Co.

526:
SILICON BRONZE ALLOYS; handbook giving physical characteristics, applications, corrosion resistance, machinability data, welding practices and weight tables. Bridgeport Brass Co.

527:
LUMINAIRES; illustrated catalogue. Beardslee Chandelier Mfg. Co.

528:
"W-B PERIODIC PROCESS OF CHLORINATION" is a pamphlet describing process of cleaning condensers. Specialties Engineering & Service Co.

529:
AIR CONDITIONING, refrigeration and unit heating equipment catalogued. Carrier Corp.

NEW PRODUCTS

Built-in Cord

Cord-away Universal unit is a full length flexible cord which does away with the nuisance of having a separate cord for each toaster, waffle iron, etc., by reason of the fact that it may be used as a standard convenience outlet. By pressing a button the cord automatically reels back into the wall. Added features of the unit are an attachment plug which fits any domestic appliance regardless of size or manufacture and an indicator bulb, mounted in the wall plate, which lights only when the heating element in the appliance is working. Manufacturers' representative on the coast is Signal Electric Supply Co.

●

Polaroid Desk Lamp

First lighting unit to use Polaroid glass is a rugged, modern desk lamp introduced by Polaroid Lighting, Inc. The lamp is said to eliminate reflected glare completely and permit the focusing of light on working plane and even distribution over reading surface. Glare removal is accomplished by the Polaroid which acts as a selector, letting through the vertical waves of seeing light but shutting off horizontal waves that cause glare.

●

Type HEA Auxiliary Relay

High-speed, hand-reset, multi-contact auxiliary relay for switchboard mounting, designated Type HEA, has been brought out by General Electric Co. to supersede the previous Type PB-58 multi-contact. The new relay is available in two models, one with 6-circuit contacts, the other with 10-circuit contacts. Operating within 20 milliseconds, the relay is said to be particularly applicable where a number of operations are to be performed simultaneously.

●

Rectifier Power Unit

Portability and better regulation are major factors in design of new rectifier power units announced by B.-L. Electric Manufacturing Company. Intended particularly for electroplating they include a fan for increased cooling. By means of a switch, both transformer secondary voltage and rectifier connections are changed to produce to optimum conditions for each d.c. output voltage.

●

Correcting Transformer

For localities where electric circuit voltages are below the correct value for refrigerators, etc., Jefferson Electric Co. has designed voltage corrective transformers. Plug of the attached 8-in. refrigerator cord is accommodated by a receptacle mounted flush with case, thus transmitting current of the desired voltage to the appliance. A switch permits selection of three different voltage taps.

WHERE TO BUY IN THE WEST

Air Conditioning
Frigidaire Corp.
General Elec. Co.
Graybar Elec. Co., Inc.
Kelvinator Corp.
Norge Division, Borg-Warner Corp.

Ammeters and Voltmeters
Ferranti Elec., Inc.
General Elec. Co.
Roller-Smith Co.
Westinghouse Elec. & Mfg. Co.
Weston Elec. Instr. Corp.

Anchors, Guy
A. B. Chance Co.
Everstick Anchor Co.
Hubbard & Co.
James R. Kearney Corp.
W. N. Matthews Corp.

Anchor and Guy Rods
A. B. Chance Co.
General Elec. Co.
Hubbard & Co.
Maydwell & Hartzell, Inc.
Frigidaire Division
General Elec. Co.
General Elec. Supply Corp.
Graybar Elec. Co., Inc.
Kelvinator Division
Landers, Frary & Clark
Leonard Division
Malleable Iron Range Co.

Appliances, Household
Apex-Rotarex Mfg. Co.
Chicago Flexible Shaft Co.
Clements Mfg. Co.
Easy Washing Machine Corp.
Edison General Elec. Appliance Co., Inc.

National Enameling & Stamping Co.
Noblitt-Sparks Industries, Inc.
Norge Division
Standard Elec. Mfg. Corp.
The Silex Co.
Thermador Elec'l Mfg. Co.
Utility Electric Co.
Wesix Elec. Heater Co.
Westinghouse Elec. & Mfg. Co.
The Woolwine-Norris Corp.

Boxes
General Cable Corp.
General Elec. Co.
Superior Switchboard & Devices Co.

Brackets, Wood
Locust Pin Co.

Breakers
Air Circuit Breakers
Electric Material Co.
General Elec. Co.
I-T-E Circuit Breaker Co.
Roller-Smith Co.
Sangamo Elec. Co.
Westinghouse Elec. & Mfg. Co.
Oil Circuit Breakers
Allis-Chalmers Mfg. Co.
Electric Material Co.
General Elec. Co.
Pacific Elec. Mfg. Corp.
Roller-Smith Co.
Westinghouse Elec. & Mfg. Co.
Line Material Co.
Pacific Elec. Mfg. Corp.

Bus Fittings
Burndy Eng'g Co.
General Elec. Co.

Buses
Aluminum Co. of America

Bushings
General Elec. Co.
Lapp Insulator Co., Inc.
Locke Insulator Corp.
Ohio Brass Company
Westinghouse Elec. & Mfg. Co.

Cable Accessories
General Cable Corp.
General Elec. Co.
James R. Kearney Corp.
John A. Roebling's Sons Co.

Cables
Aluminum Co. of America
American Steel & Wire Co.
Columbia Steel Co.
Copperweld Steel Co.
Crescent Ins. Wire & Cable Co.
Crucible Steel Co. of America
General Cable Corp.
General Elec. Co.
Graybar Elec. Co., Inc.
Hazard Ins. Wire Works
Indiana Steel & Wire Co.
Marwood Limited
Maydwell & Hartzell, Inc.
The Okonite Co.
Okonite-Callender Cable Co.
Providence Insulated Wire Co.
John A. Roebling's Sons Co.
Triangle Conduit & Cable Co., Inc.
United States Steel Corp.
Westinghouse Elec. & Mfg. Co.

Carbon Brushes
National Carbon Co., Inc.
Union Carbide & Carbon Corp.

Carbon Products
National Carbon Co., Inc.
Union Carbide & Carbon Corp.

Chimes
Copperweld Steel Co.
Square D Co.

Clamps, Ground
Copperweld Steel Co.
B. Hartman
Reliable Elec. Co.

Clocks, Program
Tork Clock Co., Inc.

Coffee Makers
The Silex Co.

Coil Winding
Jeffries Transformer Co.

Commutator Dressers
Ideal Commutator Dresser Co.

Compounds, Insulating
Clifton Mfg. Co.
John C. Dolph Co.
General Cable Corp.
General Elec. Co.
Irvington Varnish & Insulator Co.
Condensers, Electric
Allis-Chalmers Mfg. Co.
General Elec. Co.
Westinghouse Elec. & Mfg. Co.

Conduit
Aluminum Co. of America
General Elec. Co.
Triangle Conduit & Cable Co., Inc.
Youngstown Sheet & Tube Co.

Conduit, Flexible Metallic
General Elec. Co.
Triangle Conduit & Cable Co., Inc.
Wiremold Co.

Conduit, Underground
Fire Proof Wall Co.
Johns-Manville Corp.

Connectors
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